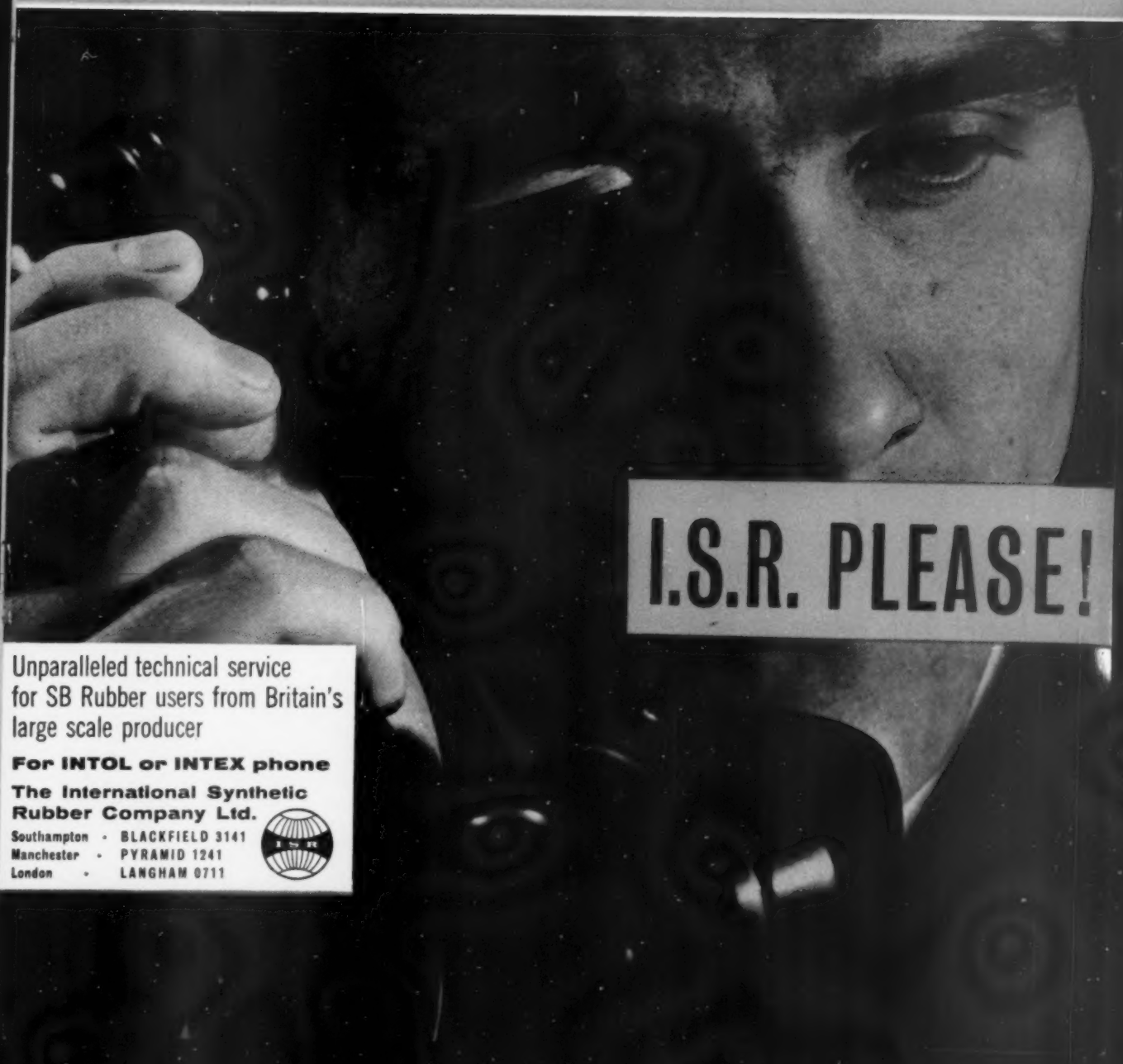
RUBBER and PLASTICS WEEKLY

VOLUME 141 NO. 16 OCTOBER 14 1961 ONE SHILLING



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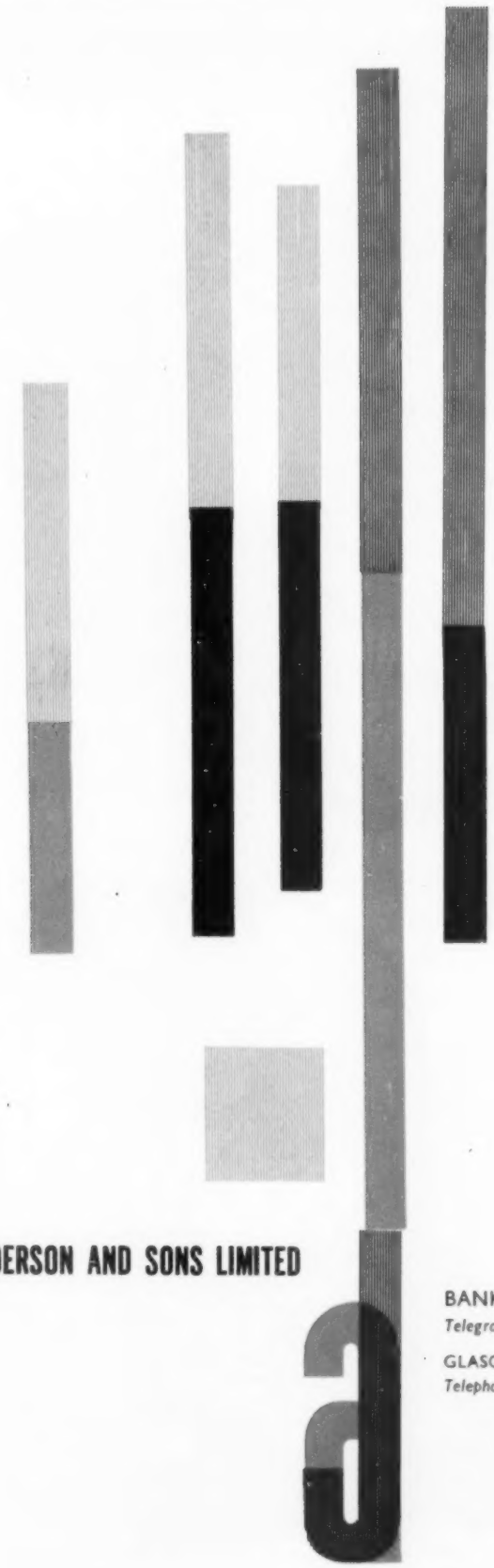

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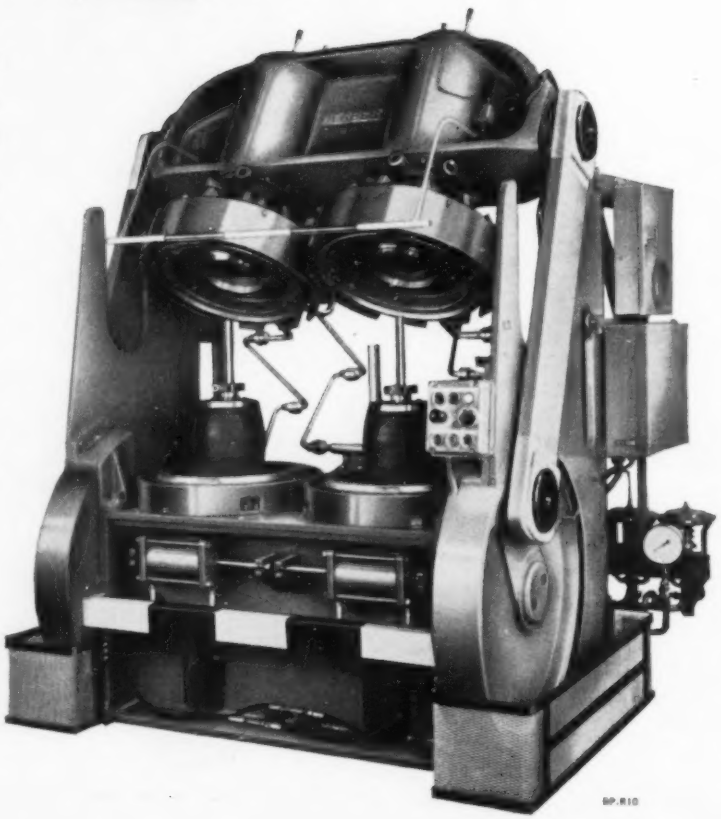

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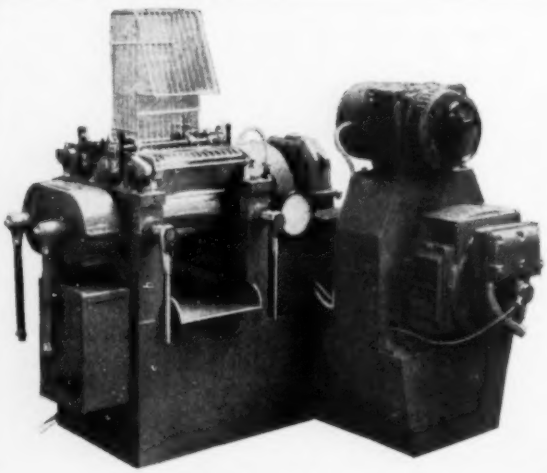

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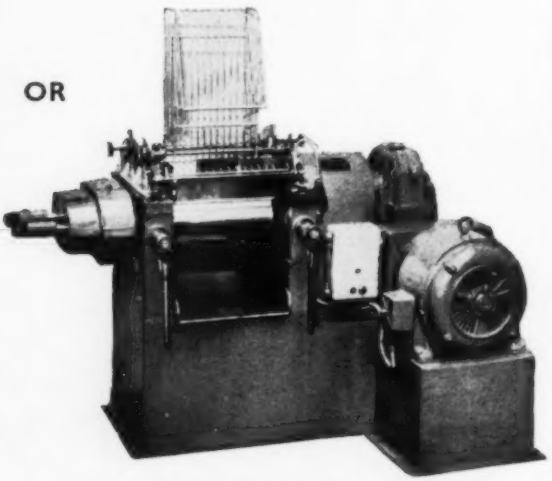

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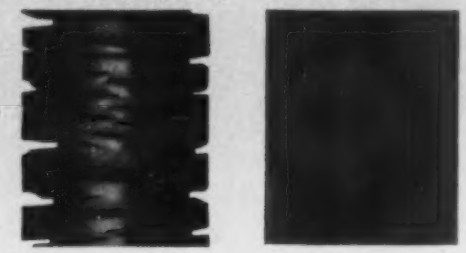
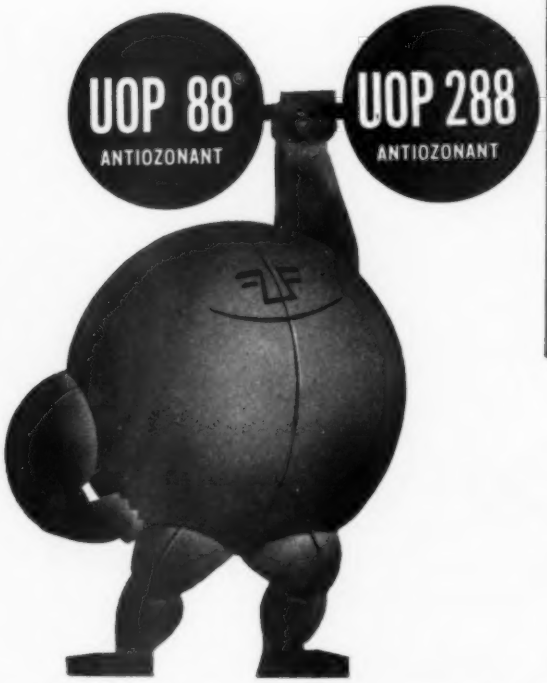


Carbon black—HAF (high abrasion furnace), Curing system—4 phr tetramethylthiuram disulfide; Hours to first crack—7 to 23.

Carbon black—HAF (high abrasion furnace), Curing system—2 phr sulfur, 1 phr N-cyclohexyl-2-benzothiazole sulfenamide. No cracks in 239 hr.



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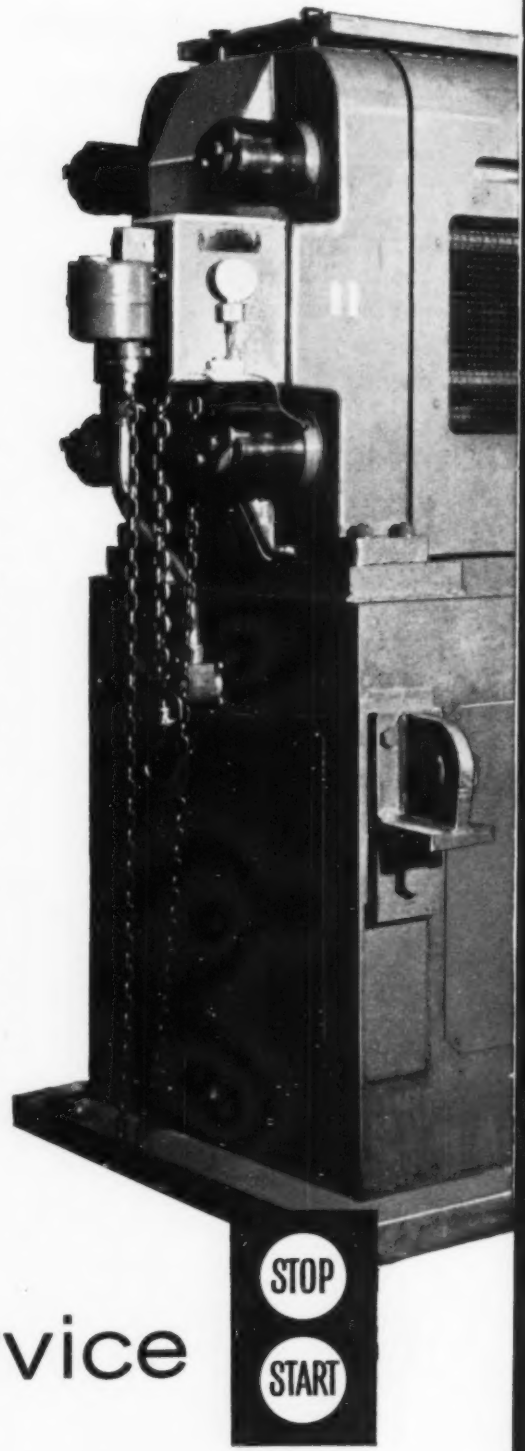

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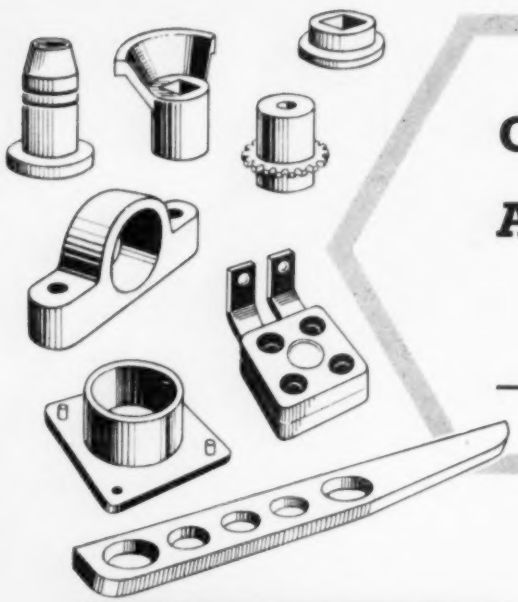

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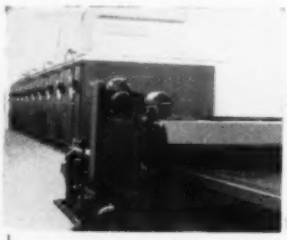

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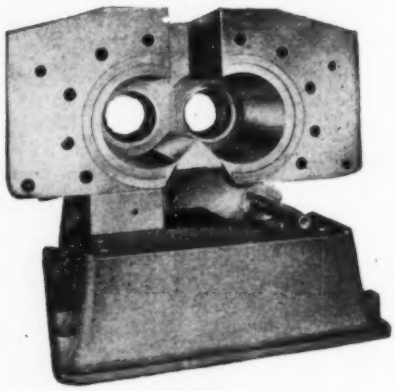
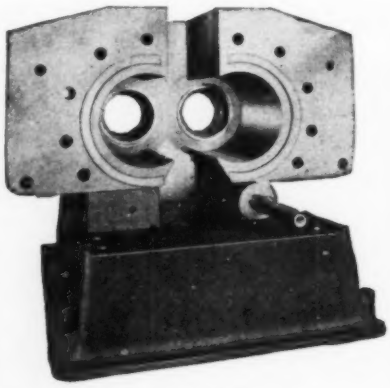
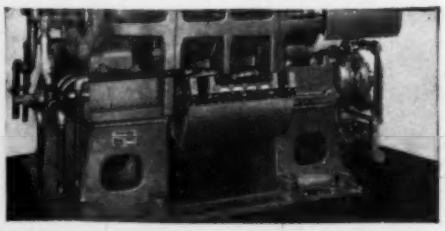
* *Banbury is a registered trade mark in many countries throughout the world*



Chamber of Banbury with drop door in closed position



Drop door partially open



Angular view of drop door in open position

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RUBBER and PLASTICS WEEKLY

Formerly 'Rubber Journal and International Plastics'

Volume 141 *IN ITS 78th YEAR* **No. 16**

October 14 1961

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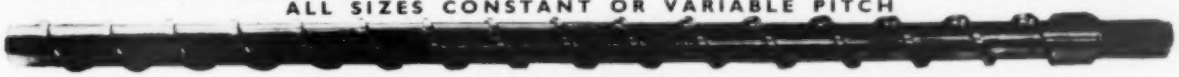

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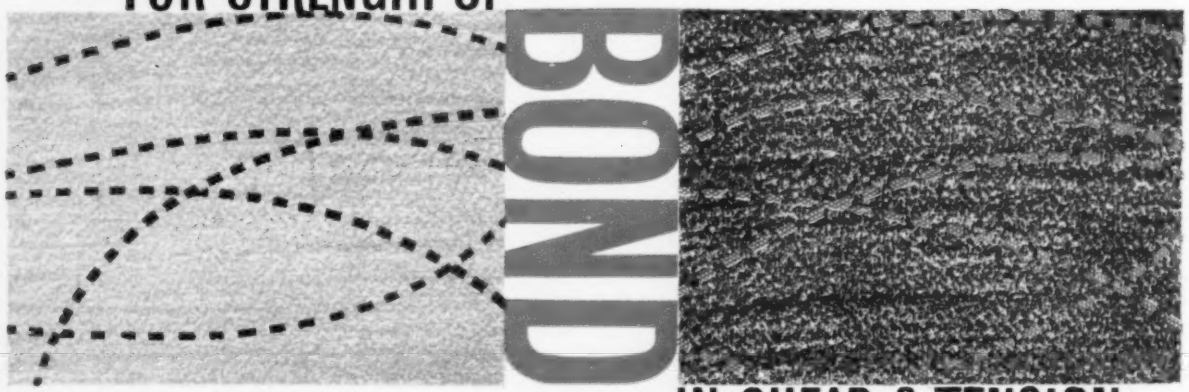

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NOTES of the WEEK

Common Market Information

WHATEVER one's personal feelings are about the UK applying to join the Common Market, all businessmen are agreed that more information is required. If the negotiations do reach a satisfactory conclusion (and this would probably not be before 1963) then manufacturers in both our industries will be presented with new opportunities — and a new set of problems. The time to examine them is now. The National Union of Manufacturers has worked very quickly in sponsoring a booklet giving background information that will help businessmen to assess both the opportunities and the problems.*

We point out this booklet, which was published on Monday (October 9), because, refreshingly, it is not polemical; it does not consider whether the UK *ought* to join the European Economic Community. And it does not deal with the political consequences of membership. The result is that a factual rather than an opinionated picture is drawn. It is essentially a summary, but it aims at making clear the considerations that businessmen should already be thinking about and acting upon. Intended particularly for those working in, or concerned with industry, there are important sections on the probable effects of joining the Six on the most important UK industrial sectors, including chemicals.

The producers of the booklet, the Economist Intelligence Unit, have prepared a special survey for RUBBER AND PLASTICS WEEKLY on the probable effect on the rubber and plastics industries of the UK joining the Six. This survey, which will appear in our annual export number, published next week, deals with both the raw material and manufacturing side of the industries. Both the survey and the booklet provide essential information on the most important economic question facing polymer manufacturers today.

Violins and Viscometers

TO anyone who enters the rubber industry — on the commercial or the technical side — 'Mooney' rapidly becomes a household word. It is almost impossible to conceive of rubber technology without the Mooney viscometer. In fact it seems as if it has been with us as long as rubber itself, and the new entrant to the industry may be surprised to learn that the man who developed it, Dr Melvin Mooney, is still very much alive. He is to be awarded one of the rubber industry's highest honours: the Charles Goodyear medal. Dr Mooney will receive the 1962 medal from the American Chemical Society's Division of Rubber Chemistry at the division's spring meeting next April.

No man deserves it more. When he retired in 1958 from the United States Rubber Co.'s research centre, he could look back on the 30 years devoted to studies of rubber's elasticity, energy absorption, etc. His viscometer was an important factor in controlling the quality of synthetic during World War II. And, of course, all synthetic is now sold with a Mooney specification.

Dr Mooney also developed a latex viscometer, two kinds of hysterometer to measure the heat build-up in rubber, and a rugosimeter for determining surface roughness. His ten patents include a moulding machine, rubber springs and a method for providing tyres with an anti-skid coating. An analysis of tension winding led to electronic winding control of rubber thread for golf balls. His work in rheology must have inspired — and still be inspiring — many scientists to follow him into this field.

Retirement has not slowed down Dr Mooney's activities. He is still doing consultant work in rubber and plastics, has written a book on world disarmament — and invented a plastics violin. A violinist himself, he has made more than 20 experimental plastics violins in his home workshop, and hopes to have the product on the market within a year. Several musicians have rated them as better than medium-priced wooden instruments. Dr Mooney is one of those vigorous personalities that the polymer industry is fortunate in producing. There is no resting on laurels. Having done work in one field, he turns to another. From our point of view he will never do more important work than he has done in developing the Mooney viscometer. But perhaps one day the Mooney violin will be music to the musician, just as the Mooney viscometer is music to the rubber technologist.

Hot Bottle

MOST companies are careful to supply consumer information which will forestall any possible misuse of their products. But it would have needed a genius at Dunlop (and a warped one at that) to prepare for what happened to one of the company's hot-water bottles. One old lady returned a bottle to the general rubber goods division, in terrible condition, because she did not think it was satisfactory. When further inquiries were made, it turned out that she had been filling it with cold water and putting it into the oven to heat up. . . .

* 'If Britain Joins?' written and published by the Economist Intelligence Unit, 5 Bury Street, London, S.W.1. Sponsored by the National Union of Manufacturers.

NEWS *Briefs*

ALTONA VINYL PROJECT COMPLETED—LARGEST LAMINATE PLANT—JAPAN POLYESTER FACTORY TEXAS-US SBR LAB. OPENED — THAI PRIVILEGE

●**Panama** — The Ultramar organization is building a refinery and petrochemical plant in Panama. The refinery is scheduled to be in operation by the end of next year.

●**Canada** — The Plastics Show of Canada, at Toronto, will take place from October 17-19 1961.

●**Japan** — Sumitomo Bakelite Co. Ltd. is reported to be installing a polyester resin manufacturing plant at its Amagasaki factory. Initial production of about 50 tons a month is expected to start this year and is likely to be increased to 500 tons shortly. Raw materials including maleic anhydride will be supplied by Nippon Shokubai Kagaku Kogyo.

●**South Africa** — A tyre featuring a steel-reinforced tread will be made in South Africa soon for off-the-road vehicles by the Goodyear Tyre and Rubber Co. (SA) Ltd. Tiny pieces of built-in steel wire, hidden beneath the tread, help these off-the-road tyres withstand punishment in such operations as mining, quarrying, and road construction work. The company's US factory is already producing the tyres.

●**Brazil** — A new firm, Castellani Industria e Comercio de Plasticos Ltda., has been set up in Sao Paulo to make plastics goods from pvc, polythene and nylon. The firm is a subsidiary of Fabrica de Bolsas Castellani. Another company which was recently set up in Sao Paulo — Ancora — has estimated that it will produce 500,000 pairs of pvc shoes this year. The Cr$30m. capital of Ancora is held by two Canadian companies, the Chartered Trust Co. and Imbank Nominees Ltd.

●**Sweden** — One of the world's largest plants for the manufacture of plastics laminates has been opened at Perstorp by Skanska Attikfabriken. A laminate press at the plant is manufacturing a new and larger sheet size (10ft. x 5ft. 3in.). See page 565.

●**Australia** — Completion of a $3.5m. Australian plant for the manufacture of vinyl resins has recently been announced by B. F. Goodrich Chemical Co. The new plant is part of a petro-chemical complex at Altona, near Melbourne, and raw materials come chiefly from other manufacturing facilities in the complex. The new plant, when added to existing Australian vinyl production, will ensure an adequate supply of vinyl resin to meet Australia's forecast needs. The plant is being operated by B. F. Goodrich-CSR Chemicals Pty. Ltd., a company formed early last year by Goodrich and CSR Chemicals Pty. Ltd. of Sydney.

●**United States** — The Texas-US Chemical Co. has just completed a new modern research and development laboratory in Parsippany, New Jersey. This comprises over 50,000 sq. ft. of space, and includes one of the most extensive compounding, processing and physical testing facilities in the SBR industry. Texas-US Chemical Co., one of the leading producers of SBR, is jointly owned by Texaco and the US Rubber Co.

●**Brazil** — The final plans for the establishment of the polybutadiene rubber plant (*RPW* August 5, 202) — by Cia. de Borracha Sintética de Pernambuco (Coperbo) — in Recife, Pernambuco, using alcohol from local sugar cane, were recently submitted to the government. The plans call for a guarantee of US$13m. and a loan of 1,500m. cruzeiros from the Bank, to finance construction of the plant. The project is scheduled for completion in two years. The plant, which will be operated by Firestone Tire and Rubber Co., will have an estimated annual output of 27,500 tons.

●**Thailand** — The Thai Tyre and Rubber Products Co. Ltd., a joint Thai-American company to manufacture tyres in Thailand, has been granted promotional privileges. The company is expected to have a registered capital of 20m. ticals. However, its total expenditure would be about 120m. ticals and this would be made easier by the grant of a World Bank loan. The plant will have a capacity of 600 or more tyres and tubes a day for trucks, buses and cars.

●**United States** — A $472,000 contract for the production of helmet liners for the US Army, has just been awarded to the Firestone Tire and Rubber Co. These will be made at the company's Fall River, Massachusetts, plant. The liners are moulded of a fibre impregnated with plastics. A harness made of fabric is attached to the inside of the liner to hold a leather headband.

"Certainly you can have the day off" he says, "we'll switch you to the nightshift" he says " — be different if you were getting married every day!" — 558

UK Production of Cycolac

MARBON AND ANCHOR ANNOUNCE GRANGEMOUTH SITE

CYCOLAC acrylonitrile-butadiene-styrene resin is to be produced in the UK. Cycolac is the brand name of the Marbon Chemical Division of the Borg Warner Corp., of Washington, West Virginia.

Some of the largest fabricated units employing Cycolac ABS are used in this American refrigerated freight car. The entire car interior is made from basic 'sandwich' parcel units, 9ft. x 42in. The tough liner is made from ABS; the sandwich filling is expanded polystyrene

An announcement was made jointly by Marbon in USA and Anchor Chemical Co. Ltd. in the UK that a site had been bought at Grangemouth, Scotland, where a plant will be erected for the production of the polymer 'and other synthetic resins'.

Rapid Sales

Anchor Chemical has been marketing the polymer in the UK for some time, and sales have developed rapidly. The company is the sole distributor for Marbon ABS in the UK.

The site is being purchased from the Town Council of Grangemouth. In making the announcement, R. Shattuck, president of Marbon, and F. Savaage, chairman of Anchor, said the plant to be constructed would be smaller than that operated by Marbon in Washington, West Virginia. Overall cost would be less than £2m., it was stated.

Site plans are at a very early stage, and no details are available of the capacity or when the plant will go on stream; but it is possible that it will be completed by the end of 1962.

Marbon's West Virginia plant has a capacity of 25m. lb. a year.

Cycolac polymers are a family of rigid plastics with high impact resistance. Industries served include the domestic appliance, transportation, construction, communications, office equipment and electrical fields. Typical products are telephone hand sets, automotive parts, ladies' shoe heels, appliance housings and vacuum cleaner parts. Marbon also manufactures rubber to metal adhesives, rubber reinforcing resins, latices, and resins for the paint industry.

McCune Heads Du Pont

Samuel W. McCune has been promoted to managing director of the Du Pont Co. (UK) Ltd. from deputy managing director.

He takes over from William H. McCoy who is returning to USA on a special assignment with the parent company, in Wilmington, Delaware.

Common Market News

Comtelburo Ltd. (Reuters Commercial Services) has launched a new weekly bulletin on the Common Market.

The bulletin, 'Common Market News', contains specialized information from Comtelburo's correspondents of practical use to the industrialist interested in marketing in Europe.

Subscription rate is £36 a year or £10 a quarter. Free trial copies can be obtained from: Comtelburo Ltd., 85 Fleet Street, London, E.C.4.

Largest Laminate Factory Opens

PERSTORP Products (GB) Ltd. has cut the prices of its three grades of decorative plastics laminate.

The new price of Swedish Perstorp Standard is 3s. 6d. per sq. ft. retail, of Relief 4s., and of Minor 2s. 7d. (trade).

The reductions follow the opening of a new factory at Perstorp, Sweden, by the parent company, Skanska Attikfabriken. The company says that the price cut is also 'due in part to the lower tariffs which have come into effect after one year's operation of the EFTA Agreement'.

The new factory, which is said to be the world's largest for the manufacture of plastics laminates, was inaugurated at a special ceremony. Present at this were Edgar Richardson, managing director of Perstorp Products (GB) Ltd., with a party of representatives from George E. Gray (Plastics) Ltd., of Ilford, and Channel Plastics, of Bristol.

●Decorative laminate price cuts have also been announced by Fablon Ltd., and Arborite (UK). Fablonite standard range has been reduced by 9d. to 3s. a sq. ft. The standard and bending grades of Arborite have been reduced by 4d. to 3s. 6d. a sq. ft.; Bakelite Ltd. recently cut the price of its Warerite standard range to 3s. 2d. a sq. ft.

Small Disposal

Sales from the Board of Trade's stock of natural rubber in September totalled only 25 tons, for November delivery.

On October 1, 26,510 tons of rubber remained available for sale.

EXPORT ISSUE

Next week's issue of *RPW* (October 21) will be the annual export number.

This 200-page issue will contain a study of the effects of the UK joining the Common Market on the rubber and plastics industries, specially prepared for *RPW* by the Economist Intelligence Unit.

Other special articles include:

- **Injection Moulding Machinery — a survey of the whole UK industry.**
- **The Price of Foam — analysis of the costs of producing natural and synthetic natural foams.**
- **Organotin Stabilizers.**
- **Dithiol Cure in Chlorinated Butyl.**
- **Dip Coating of Plastics.**
- **Developments in Compounding Ingredients.**

Howards: Two Major Projects

FOR PLASTICIZERS, CYCLOHEXANOL AND CYCLOHEXANONE

HOWARDS of Ilford Ltd., a member of the Laporte Industries Group, announced on Tuesday (October 10), plans for two major projects.

The first concerns a new unit to make dicyclohexyl phthalate, a solid plasticizer extensively used in the transparent packaging film and paper industries.

It is said that this will be much larger than Howards' present unit and 'will supply all likely increases in home and export requirements of this material for some years to come'.

Construction is scheduled to start in the next few months and completion is expected before the end of 1962.

Oxidation of Cyclohexane

The second project covers the construction of a plant to produce cyclohexanol and cyclehexanone by the direct oxidation of cyclohexane with air.

This plant will have an annual capacity of 9,000 tons of total products. The cyclohexanol and cyclohexanone products will be sold by Howards as such or in the form of derivatives such as dicyclohexyl phthalate, resins, cyclohexylamine, etc.

It is expected that this unit will be completed by the end of 1963.

The cost of the two projects has not been disclosed.

Howards, which became part of the Laporte Group earlier this year, produces, among other chemicals, a special range of plasticizers suitable for vinyl films and coatings, including copolymers. One example is Howflex BB, which is a mixture of the isomeric di-(dimethyl-cyclohexyl) oxalates.

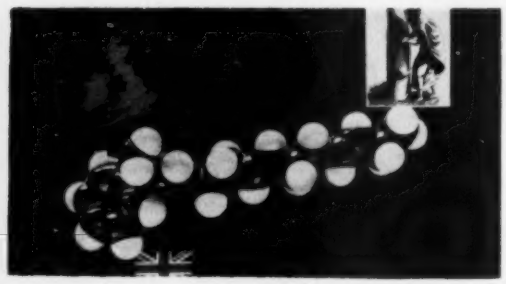
Six Language Selling

THE Federation of British Rubber and Allied Manufacturers has produced an illustrated booklet designed to publicise the British rubber industry in the seven other countries of the European Free Trade Association.

Six different versions are being published in the six languages concerned — Swedish, Danish, Norwegian, Finnish, German (for Austria and Switzerland) and Portuguese. Copies are being mailed to a carefully selected list of industrial users, importers, department stores, hospitals and other prospective customers in the EFTA countries.

The booklet is printed in four colours, with 11 page or half-page drawings and numerous thumb-nail sketches. Over 600 of the industry's products are listed under 13 main categories, and a reply card is bound in at the back to encourage enquiries.

Since the beginning of 1959, direct exports of rubber products (apart from tyres) to these countries have increased by more than 50%; and the Federation states that it hopes that this vigorous co-operative effort will enable a similar rate of progress to be maintained or even bettered, while negotiations for UK participation in the Common Market are proceeding.



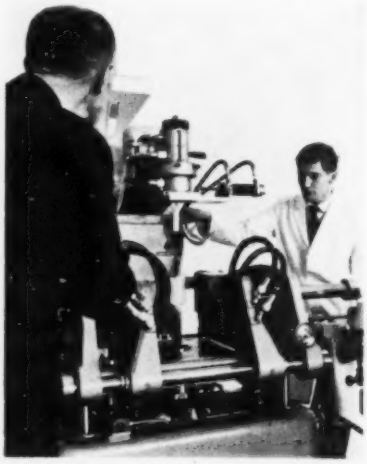
The front cover of the German edition of the FBRAM's EFTA booklet

Dixie 70 Down

Anchor Chemical Co. Ltd. has announced reductions in the price of Dixie 70 ISAF carbon black. Current prices are: min. 3 ton lots, 9¼d. per lb. ex Swansea; min. 1 ton lots, 9¼d. per lb. ex Swansea; smaller quantities 10½d. per lb. ex store.

USI Opens Zug Technical Service Laboratory

A NEW laboratory designed for polythene research, evaluation and technical service has been opened in Baar, Zug, Switzerland, by US Industrial Chemicals Co. International, a division of National Distillers and Chemical Corp. The research centre will service markets in all European countries and many other world markets.



Demonstrating on extrusion bottle-blowing equipment the characteristics of a very low melt index USI resin at the new Zug laboratory

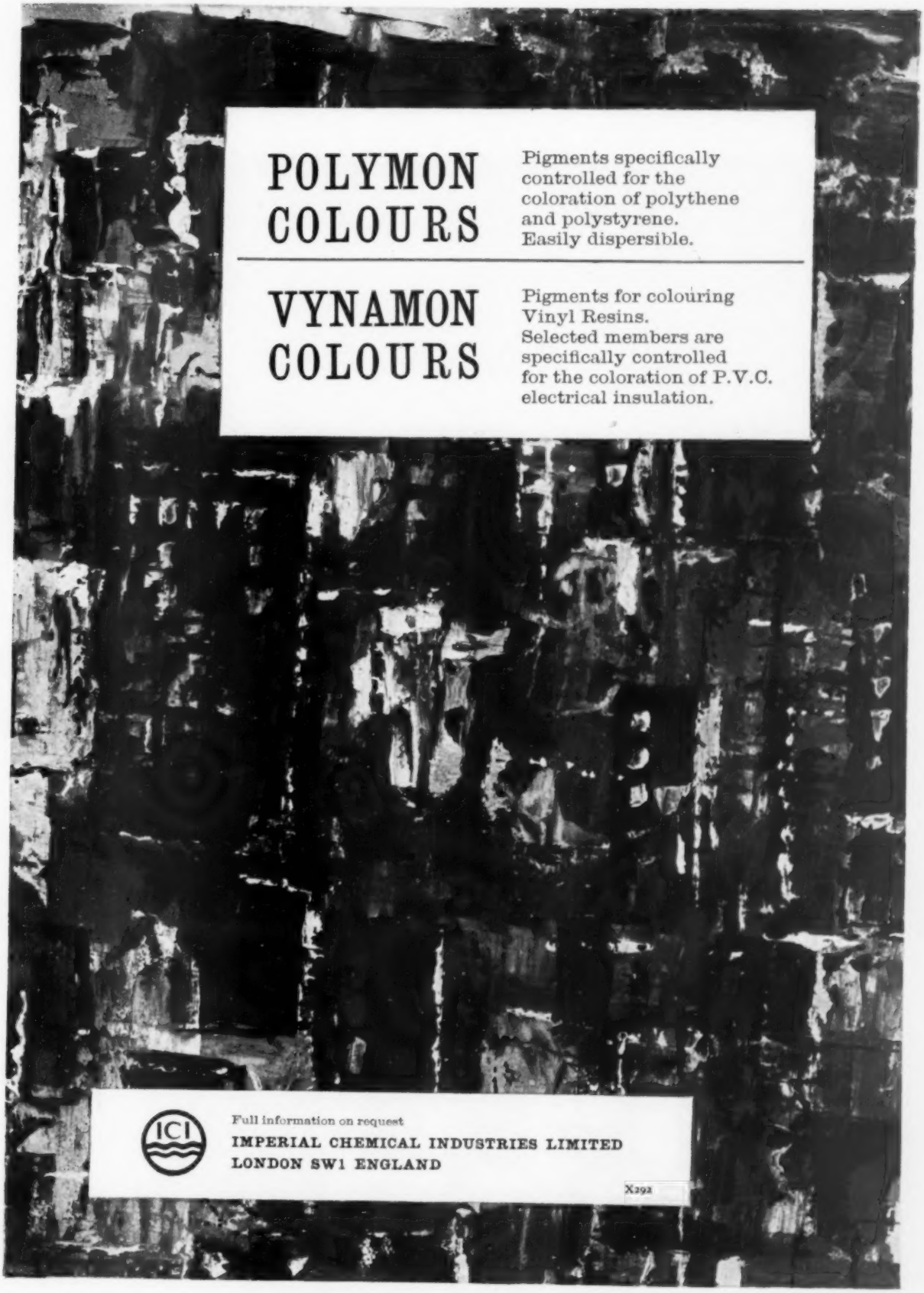
In addition to laboratory facilities, the building will act as headquarters for USI International's sales organization. The company has been operating at temporary headquarters in Zug since its incorporation in September 1959.

According to John C. Bierwirth, chairman of National Distillers, 'The new laboratory will help USI International's polythene customers produce better products for existing markets and develop new products for future markets. A complete line of polymer testing equipment will also ensure the highest quality control'.

The sales organization is under the direction of Michael Renaud, commercial manager. Howard Woodham is the technical manager.

The new laboratory is equipped with the latest machinery for plastics processing and testing. Most of it is of European design.

The major processing equipment is for blown tubing extrusion; blow moulding; paper, film and foil coating; cast film extrusion; injection moulding and blending and compounding. Three test laboratories are devoted exclusively to the determination of physical, mechanical and appearance properties of polyolefin products.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PLASTICIZERS FOR PVC—PART 6

Properties of Plasticized Compounds

BLENDS OF PLASTICIZERS MOST COMMONLY USED

By W. S. PENN, BSc

IN the last two articles of the series it is proposed to consider the properties of compounds which are imparted by the different types of plasticizers and their blends. This is a big subject, however, since it is not only necessary to consider the well-known physical properties such as tensile strength and tear resistance, but the equally important properties such as resistance to extraction by various solvents, volatilization and so on.

Because of this differentiation between types of properties, the present article is concerned with the more important physical properties only. The more specialized properties will be dealt with in the final article, together with a detailed account to assist in a choice of plasticizer.

Apart from a consideration of properties in the usual way, it is also proposed to study compounding at the efficiency level. Some detail is also given on the use of mixed plasticizers and how these may be used to obtain a more judicious choice of plasticizer.

One feature of the present article and the final article is the comparison between monomeric and polymeric types. Where appropriate they are considered individually but direct comparisons are also made to bring out the difference between the two. In this connexion it is necessary, once again, to be quite clear on the meaning of the expressions 'monomeric' and 'polymeric' plasticizers.

Actually, the expression 'monomeric plasticizers' is quite incorrect. The materials are not monomers in the sense that they polymerize. The use of 'monomeric' was coined as opposite to 'polymeric' — nothing more. It would be more descriptive and accurate to use the term 'low molecular weight plasticizers'. At the moment the molecular weights vary between 300 and 450 but molecular weights as high as, say, 500 or 600 could be visualized.

The expression 'polymeric plasticizers' is more correct as many of them are produced by polymerization. However, since the molecular weights vary between, say, 1,000 and 8,000 (at higher values they would normally not be very effective plasticizers), a better description would be 'high molecular weight plasticizers'. This is because some of the materials, normally included under the heading of 'polymerics' are not polymers at all but merely high molecular weight chemicals. The best examples are the epoxidized oils and esters.

Comparison of Properties

Before considering the properties of plasticized compounds in detail, it is useful to make a comparison of the properties of some of the more common types. Such a comparison is given in Table 1.

The compound used to obtain the results shown in Table 1 consisted of 100 parts polymer; 60phr plasticizer and 2.0phr calcium stearate. PPA has been given as a typical polymeric plasticizer although actually it is not and a commercial type would normally be employed. Cereclor 42 has been given as a typical example of a secondary plasticizer or extender.

The differences between the groups are well marked in Table 1. The very poor low temperature resistance of the phosphates and PPA is most marked compared with the others and they clearly would not be used where these properties are of importance. If a high molecular weight material is required with fair low temperature properties, then epoxidized oil can be used. This material also has excellent stabilizing characteristics.

The excellent low temperature resistance of DBS is most marked, as is the high voltatility of DBP which at room temperature gives a very flexible compound. The high physicals of the phosphates are impressive and the marked resemblance of DIOP to DOP is also noticeable. DAP too is similar to DOP but is a little inferior on extraction characteristics.

Softness

Some explanation is necessary regarding the softness and/or hardness of pvc. In the rubber industry the hardness is measured on the BS scale (in the UK) and the higher the number, the harder the compound. The BS Hardness scale, in general, is similar to the widely used US Shore scale.

In the case of pvc, it is normal to employ the BS softness number (BS 2571). Here, the higher the number, the higher the softness or the lower the hardness which is the opposite to the result in rubber testing.

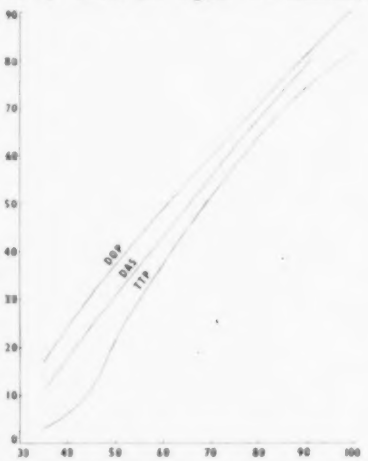

Fig. 1. BS softness against plasticizer content. The compound contained: Polymer 100, plasticizer as shown on the horizontal axis, basic lead carbonate 7, calcium stearate 0.75

As would be expected, the softness is increased with increasing plasticizer

TABLE 1

COMPARATIVE PROPERTIES OF COMMON PLASTICIZERS

	Tensile strength, psi	*Modulus at 100% elongation*	*Elongation at break, %*	*Volatility (24hr. at 85°C.)*	*Cold flex temperature °C.*	*Extraction by mineral oil (250 hr. at 20°C.)*
DOP	2,575	1,135	350	0.53	−23	1.98
DBP	2,510	840	345	9.2	−25.5	2.55
DIOP	2,695	1,205	345	0.42	−23	2.44
DAP	2,420	1,055	390	0.44	−25	3.02
TTP	3,350	1,880	285	0.38	−1.5	0.58
TXP	3,425	2,070	270	0.31	+1	0.46
DBS	2,120	660	430	3.30	−56	19.12
PPA	2,760	1,920	210	0.02	−2	+0.92
Cereclor 42* ..	2,525	1,140	360	0.37	−19	2.01
Epoxidized oil..	2,950	1,500	335	0.80	−1	0.79

* In a mixture of 2 : 1 DOP Cereclor 5.5

Q SRF Black from oil?

A

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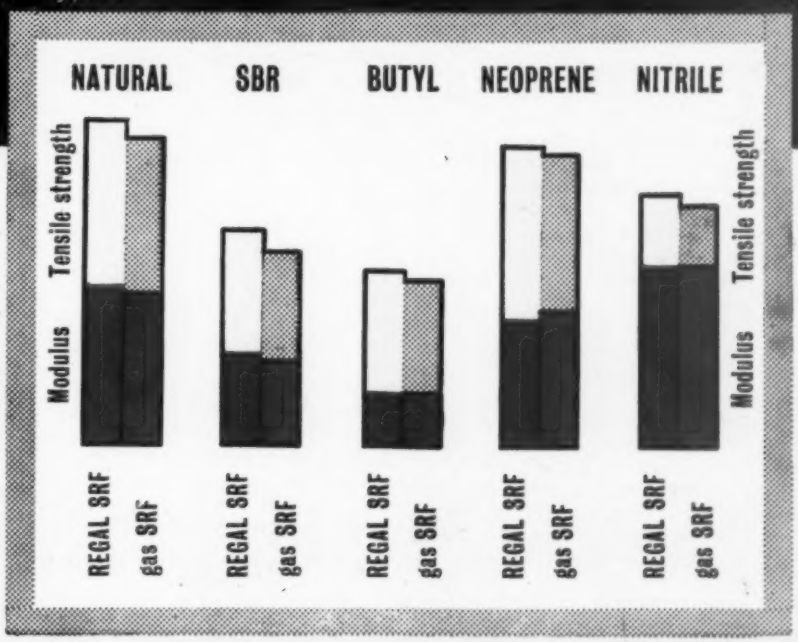

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content. This is illustrated in Fig. 1 for a number of common plasticizers. It is interesting to note that for much of their length, the curves are fairly straight. Only at the ends of the curves, where softness measurement is difficult and subject to much error, do the curves deviate markedly. Fig. 1 also indicates the hardness differences of the various plasticizers.

The softness varies considerably with temperature. The degree of change will depend on the plasticizer content so that it is possible to modify the compound by compounding to have a desired softness at any specific temperature. Another point to remember is that with increasing temperature, the difference in hardness between different plasticizers becomes more apparent. Some results are illustrated in Fig. 2.

By using such curves as Figs. 1 and 2, it is possible to determine the

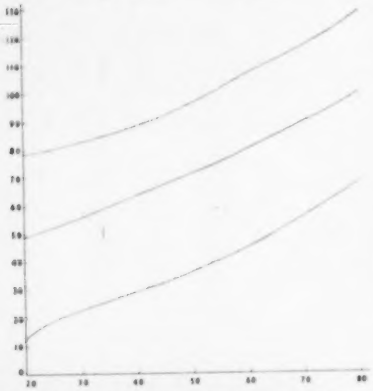

Fig. 2. BS softness against temperature. Temperatures are in °C. on the horizontal axis; the three graphs are for DOP, DOS and TTP

plasticizer to use to give a certain softness at a given temperature.

Physical Properties

It is quite obvious that physical properties will vary considerably with varying plasticizer content. In general, tensile strength, modulus, tear resistance and abrasion resistance all drop, whilst elongation and flexibility at low temperature increase. Most of the curves are fairly 'straight line' and normally expected values are predictable.

Some curves to illustrate these principles are given in Fig. 3 for tensile strength and modulus at 100% elongation.

Another way of looking at such results, and one which is quite common in the UK, is to draw curves of physical properties against BS softness. This, of course, gives results relative to plasticizer changes. Some results for elongation are given in Fig. 4.

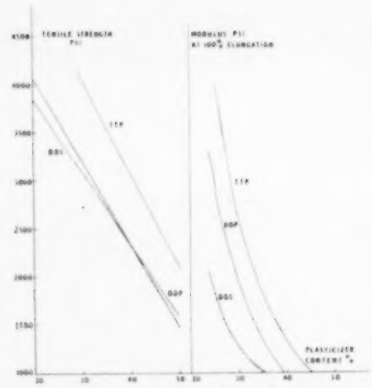

Fig. 3. Tensile strength and modulus against plasticizer content

Sensitive to Change

In general, the physical properties are very sensitive to changes in plasticizer content and this point must be very carefully watched in any compounding work. For example, if it is desired to obtain greater elongation or improvement in cold temperature properties, it will usually not be sufficient just to add more plasticizer. Obviously other properties will suffer. In such a case it is usual to increase the plasticizer to what is considered to be a safe point and then to replace some of the plasticizer with another type which will enable certain properties to be changed, leaving the others much as they were.

Apart from change of physical properties with increasing plasticizer content, there is also the question of 'sweating' or exudation if the compatibility level is exceeded. This problem will hardly ever be encountered with the primary plasticizers but with the secondary plasticizers and extenders it is a point which must always be watched.

Polymeric plasticizers are not normally employed for the physical properties they impart. However, it is

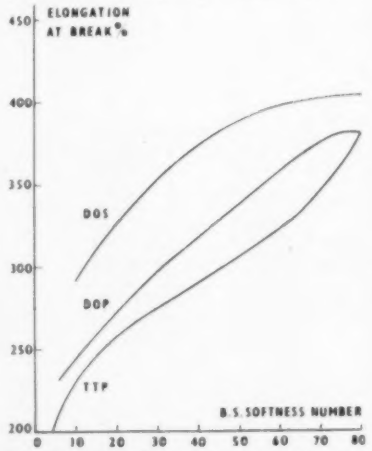

Fig. 4. Elongation at break against BS softness

useful to examine these if only on general grounds.

In the case of Group 4A plasticizers (such as PPA and PPS) the tensile strength and modulus are high, the compound is hard and the low temperature properties are not particularly good. In the other groups, with lower viscosities, these properties tend to approach those of DOP compounds. With epoxidized esters, the low temperature properties are very good and approach the sebacates, a most important characteristic. As with monomeric plasticizers, the properties vary with plasticizer content. The tensile strength drops, the elongation increases and the cold flex is improved, although nowhere near to the same extent as with monomeric plasticizers.

Efficiency Levels

The general principle of effectivity or efficiency quantity was considered in Article 2. Some details of monomeric plasticizers are given in Table 2.

In this list the most efficient plasticizer is DBS and the least efficient TXP, which means that far more plasticizer needs to be incorporated

TABLE 2
EFFICIENCY PROPORTIONS AND FACTORS

	Efficiency proportion	*Efficiency factor*
DOP	63.5	1.00
DIOP	65.5	1.03
DAP	61.2	0.97
DNP	74.2	1.17
DBP	54.0	0.85
TTP	79.3	1.25
TXP	83.1	1.31
DBS	49.5	0.78
DOS	58.8	0.93
Sebacate 79 ..	57.1	0.90
DOA	59.9	0.94

The Efficiency Proportion is the number of parts of plasticizer needed to give a modulus of 1,000psi at 100% elongation, and the Efficiency Factor is the Efficiency Proportion divided by the Efficiency Proportion of DOP (63.5).

to give the same properties. A knowledge of these factors can be extremely useful in compounding since, in replacing say a proportion of TTP with DOS to improve low temperature properties, the amount to be added to keep the remainder of the properties the same, can be readily determined. Thus in a compound containing 50phr TTP if 20 parts of this is removed and is to be replaced with DOS, and if it is desired to kep the modulus the same (as it usually is) then the 20 parts TTP will be replaced by 20 x 0.93/1.25=14.9phr DOS.

Extending this principle further, it is now possible to compare properties at a constant quantity of plasticizer (60phr) and the efficiency quantity. Such a comparison is made in Table 3.

TABLE 3
COMPARISON OF COMPOUNDS CONTAINING CONSTANT PLASTICIZER AND EFFICIENCY PROPORTIONS

	Properties with 60phr plasticizer		*Properties with efficiency proportions (from Table 2)*	
	Tensile strength, psi	*Cold bend, C.*	*Tensile strength, psi*	*Cold bend C.*
DOP	2,530	−23	2,310	−27.5
DIOP	2,665	−22	2,485	−30
DAP	2,395	−25	2,310	−28
DNP	2,810	−12.5	2,320	−24.5
DBP	2,470	−25	2,590	−21
TTP	3,350	−1.5	2,550	−13
TXP	3,410	+1	2,490	−12.5
DBS	2,130	−56	2,450	−39
DOS	2,330	−47	2,330	−46
Sebacate 79	2,370	−48	2,390	−47
DOA	2,400	−49	2,390	−50

It will be noted that in general the results are predictable. In other words, if more plasticizer has to be added to give the efficiency proportion then the tensile strength is depressed and the cold bend temperature is lowered and vice versa.

The polymeric plasticizers may be considered in a similar way and some efficiency proportions and factors are given in Table 4.

TABLE 4
EFFICIENCY QUANTITIES AND FACTORS

	Efficiency proportion	*Efficiency factor*
DOP	63.5	1.00
DBP	54	0.85
TXP	83.1	1.31
Abrac 'A'	78	1.23
Abrac 'C'	56.5	0.89
Lankroflex ED 3	58	0.91
Hexaplas PPA	85	1.34
Hexaplas PPL	65	1.02
Paraplex G25	84	1.32
Paraplex G60	62	0.98

It should be stressed that the results in Table 4 are based on only one set of experimental results and values can easily change. However, certain trends are most marked. Some of the early polymeric plasticizers (based on PPA and PPS) were the most inefficient of all. Some of the newer polymeric plasticizers (Hexaplas PPL and Paraplex G60) are virtually as efficient as the monomeric plasticizers. The same may be said of the epoxidized materials so there is no need to limit the use of polymeric plasticizers on the grounds of lack of efficiency.

In spite of these comments, probably none of the polymerics are true primary plasticizers (using the definition of compatability up to 150phr plasticizer). Nearly all of them exude to a slight degree at least under certain conditions of quantity used or interaction with stabilizers. Frequently, therefore, they are not used as the sole plasticizers.

PPA in Group 4A has limited compatibility which may be overcome by the use of a proportion of monomeric plasticizer, but this introduces the defects of the type. PPS, also in Group 4A, is rather difficult to incorporate (see below) but once in is quite compatible when used alone. The same may be said of PPS/MCA and PPA/MHA (Groups 4B and 4C). The same improvement is obtained in going from Hexaplas PPA and Paraplex G25 to Hexaplas PPL and Paraplex G60. The epoxy plasticizers are not particularly compatible although the glycerides are better than the esters.[1] The resin and stabilizer, however, can affect the compatibility and with lead stearate, for example, a greasy exudation develops after a few weeks if the epoxy is used as the sole plasticizer. In working with polymeric plasticizers, the only real answer is to carry out an exudation test with each compound.

Fluxing Properties

The fluxing or processing properties of the polymeric plasticizers need to be considered carefully. The Group 4A plasticizers do not have a very powerful solvent action on pvc and therefore need special processing conditions. High mixing temperatures for pre-mixes (100°C.) and Banbury mixing (*e.g.* 170°C.) are necessary and the use of lubricants is advisable to avoid sticking to hot-metal parts in mixing and calendering. The materials are not suitable for paste work on account of their high viscosity. However, they can be diluted with aromatic (but not aliphatic) hydrocarbons for organosols. Finally, the gelling temperature during final processing needs to be higher. All these defects may be partly overcome by admixture with primary plasticizers but this does, of course, reduce the value of the 'polymeric' properties of the plasticizers.

Most of the plasticizers in the other groups can, in general, be processed under normal conditions. They may be used in plastisol formulations, although slightly higher paste gelling temperatures are advisable. Some clue to the behaviour of the various groups of polymeric plasticizers may be gained from their viscosity. The higher this is the more difficult the plasticizer is to process. The earlier plasticizers, Hexaplas PPA and Paraplex G25 (for example), have high viscosities (900 and 1,700 poises) while the new plasticizers Hexaplas PPL and Paraplex G60 have considerably lower viscosities (7.5 and 2-3 poises).

Mixed Plasticizers

Although it was quite common at one time to use compounds containing one plasticizer only, it is comparatively rare nowadays. The situation has changed over the years as more and more plasticizers have become available.

There are two main reasons why blends of two, and often three, plasticizers are used. The first and original reason was to obtain a balanced combination of properties which would not have been possible with only one plasticizer. The best examples of this sort of thing are the partial replacement of phosphates with sebacates to give good low temperature properties and the partial replacement of phthalates with phosphates to give satisfactory flame-resistant properties. Electrical properties, drape, resistance to solvents and the like can all be modified at will by the use of mixed plasticizers to give tailor-made compounds. The use of mixed plasticizers to improve processing properties should not be forgotten.

Cost Reduction

The other principal reason is to blend to reduce the cost of compounds containing expensive plasticizers. In the first place such stratagems as the partial replacement of plasticizers with their '79' counterparts, or the partial replacement of TTP with TXP etc., were tried but in many cases complete replacement with these materials has taken place. In other words, although partial replacement of primary plasticizers with cheaper primary plasticizers is carried out extensively, the complete replacement is perhaps more common. In addition, the cheaper primary plasticizers, in their turn, are being partially replaced with secondary plasticizers and extenders. This is an important movement and, with the extensive introduction of fillers, forms a very important department of pvc compounding.

Direct Relationship

It is interesting and useful to know that most plasticizer replacements give *pro-rata* properties. That is to say that if a phosphate is being replaced with a sebacate the resultant compound

will have properties of both in proportion to the amount of each in the mix. In other words, a straight line relationship exists. The rule is neither invariable nor exact but in so many cases it is near enough to be used in practical compounding.

This rule, which applies so much in technological work, implies that, in general, unusual effects are infrequently obtained. One rarely expects the use of two plasticizers to give a totally unpredicted result. If such a result is obtained there is usually some sort of special explanation. For example, if a small proportion of an epoxidized oil is used as a plasticizer, the results obtained are rather superior to the effect obtained by the mere blending of two plasticizers. In this case the function of the epoxidized oil as an efficient stabilizer contributes greatly to the phenomenon.

An example of the replacement of a conventional plasticizer (DOP) with an extender (Dutrex 3 — a petroleum residue) is given in Table 5.

Some of the results in Table 5 appear to be surprising. With quite a high replacement of DOP, the tensile strength is increased, the same applying to the modulus; the elongation is not reduced very much; the tear strength increases and so does the volume resistivity. This would appear to be a strong recommendation for using such large proportions of Dutrex 3 wherever possible.

Trap for the Unwary

This sort of attitude is a trap into which many fell when such materials were first looked at. As in any other field it is not possible to get something for nothing. It is necessary to examine the negative side of such compounds. First the cold crack properties deteriorate, although not seriously, and then the permanent set is increased, again not seriously, but enough to affect some applications. The greatest objection of all, however, and one which is not usually measured is the exudation which takes place. This will vary from compound to compound but with 25% replacement of plasticizer it is likely to be pronounced. Marring properties would be seriously affected.

In spite of all these objections to certain extenders (Dutrex 3 has only been taken as an example) Dutrex is a useful product in comparatively small quantities. It is perfectly safe in cable sheaths, conveyor belts and such 'heavy' applications and at a price almost one-tenth of a conventional plasticizer, it can result in a worthwhile saving in cost.

Better Electrical Properties

An interesting point about the results in Table 5 is the improvement in electrical properties. This is quite common with various extenders and is again illustrated in Table 6. The point is that the polymers have much better electrical properties than the plasticizers from which it follows that the less the amount of plasticizer in a compound the better the electrical properties. The introduction of an extender reduces the percentage of plasticizer present and thus improves the electrical properties.

A further example of the replacement of primary plasticizers with a secondary type is given in Table 6.[2] This time, I.C.I. Chlorinated Paraffin P50 has been used and their Cereclor 42 is very similar.

A few 'scatter' results may be seen in Table 6 notably the tensile strength of the 20:40 compounds, the dip in the electrical results and the increase in elongation at the start. Generally, however, sooner or later, the results conform with the suggested principles.

TABLE 5

REPLACEMENT OF DOP WITH DUTREX R

Polymer	100	100	100
DOP	50	40	30
Dutrex 3	10	20	30
White lead	5	5	5
Tensile strength, psi	2,160	2,450	2,590
Elongation at break, %	275	275	260
Modulus at 100% elongation	1,180	1,760	1,675
Tear strength, lb./in.	350	400	425
Permanent set, %	17	15	20
Cold crack temperature, °C.	−35 to −40	−35 to −40	−30 to −35
Volume Resistivity, ohm/cm.	4.3×10^{10}	7.1×10^{10}	2.0×10^{11}
Plasticizer volatility	5.3	6.3	7.7

TABLE 6

REPLACEMENT OF DAP WITH CHLORINATED PARAFFIN P50

Polymer (Corvic D65/8)	100	100	100	100	100	100
DAP	60	45	40	30	20	—
P. 50	—	15	20	30	40	60
White lead paste	8	8	8	8	8	8
Calcium stearate	1	1	1	1	1	1
BS softness	54	47	46	38	32	26
Tensile strength, psi	2,360	2,640	2,760	2,790	3,290	3,090
Modulus at 100% elongation	960	1,170	1,260	1,510	1,820	2,070
Elongation at break	360	370	380	350	340	320
Cold flex temperature, °C.	−30	−24	−22	−16	−9	0
Volume resistivity, ohm/cm.	1.3×10^{13}	6.2×10^{12}	6.0×10^{12}	7.5×10^{12}	1×10^{13}	9.4×10^{12}
Ageing loss, % (24hr. at 100 C.)	0.58	0.84	0.90	0.99	1.0	1.4

REFERENCES

[1]T. C. Moorshead, 'Epoxy Plasticizers for pvc', *Plastics*, August 1957.

[2]Based on I.C.I. Ltd. literature, 'Chlorinated Paraffins in pvc Compounds', Report No. G.C.S. 21513.

Since the next issue of *RPW* is our special export number, the concluding article of this series will be published in the October 28 issue.

PCC Fillers for Polythene

Recent work carried out in the laboratories of John and E. Sturge Ltd. has shown that when precipitated calcium carbonate is used as a filler in the processing of polythene, the finished product has increased stiffness and added whiteness. The cost of the polythene is also reduced.

A provisional data sheet, from the company, states that loadings of pcc of up to 500 parts per 100 of resin have been incorporated in a low density polythene, and that these heavily-laden dispersions could serve as masterbatches for subsequent processing.

Tensile Strength

The data sheet includes a table showing comparative figures for ultimate tensile strength, extension at break, and brightness, for unfilled polythene and for polythene loaded to 50phr with Sturcal M. and Calopake F.

It is claimed that Sturge pcc is suitable for use with polythene in compounds to be extruded, vacuum-formed, compression and injection moulded.

Pneumatic Mural

A mural depicting John Boyd Dunlop's contribution to transport has been commissioned for the new Dunlop Memorial Hall to be opened at Dreghorn, Aryshire, today (October 14).

The artist is John Holden, of London.

Dreghorn is the birthplace of John Boyd Dunlop, the Scottish veterinary surgeon who invented the first practicable pneumatic tyre in 1888.

Natta Awarded First SR Medal

'THEME OF POLYMERIZATION DEVELOPED AS GRANDIOSE FUGUE'

'NATTA has developed the theme of polymerization as a grandiose fugue. The successful initiation, prosecution and completion of so much and so varied research is the result of his most unusual originality, drive and power of sustained work'. This was said by Sir Robert Robinson, when Professor Giulio Natta was awarded the first international synthetic rubber gold medal.

The presentation — organized by *Rubber and Plastics Age* — was made at a dinner at the Savoy Hotel, London, by Sir Edward Beharrell, chairman of the Dunlop Rubber Co. Ltd. More than 170 people, many from abroad, were present at the dinner.

Sir Robert Robinson, one of the world's leading organic chemists and a Nobel Prize Winner, pointed to a certain parallel — and yet an interesting contrast — in the experience and scientific careers of Ziegler and Natta. Ziegler had devoted his academic life work largely to the study of organo-metallic compounds. When he had become director of the Max-Planck Institute at Mülheim he had followed Franz Fischer of Fischer-Tropsch fame and had soon discovered the reaction which bore his name. At first olefines had been dimerized and made into waxy polymers of relatively low molecular weight. Later, said Sir Robert, the astonishing effect of addition of a transition metal salt to the aluminium alkyl catalyst had led to low pressure polythene. It was fair to say that he had developed his work as an organic chemist using physico-chemical auxiliaries.

'Natta, on the other hand', went on Sir Robert, 'was, and is, essentially a physical chemist who used organic chemical substrates. His contributions had been made largely by studies of reaction kinetics and of molecular structures by means of X-rays and electron diffraction. Using such methods he has been able to expand our knowledge of catalysts and polymerization in a truly dramatic manner. The analogy with Mülheim in pre-Ziegler days is illus-

Some of those present at the synthetic rubber dinner *(left to right)*: **1. P. W. Howard (president of RAPRA) and Sir Edward Beharrell (chairman, Dunlop Rubber Co. Ltd.). 2. N. A. Iliff (Shell Chemical Co. Ltd.), P. W. Hawkins (Dunlop) and E. R. Rowzee (president and managing director, Polymer Corporation). 3. E. A. Murphy (Dunlop Research Centre) and A. Giachin (Montecatini). 4. J. C. Garrels (Monsanto Chemical Co. Ltd.), Mrs Scott and Dr Scott (BTR). 5. Professor Giulio Natta. 6. G. E. Holmes-Seidle (secretary and registrar, IRI), G. Martin (chairman of Council IRI) and Dr Bredt (TNO, Delft). 7. K. A. M. Barton (Midland Silicones) and E. A. Madge (Dunlop). 8. Miss C. H. Chenhalls (secretary, FBRAM), Mrs Parr and C. Parr (Hytex Ltd.). 9. R. Woodfine (Esso), John Mulroy and George Clark (Phoenix Rubber Co. Ltd.)**

trated by his work on methanol synthesis and on the oxo-reaction. In collaboration with P. Pino and others he carefully examined the behaviour of α-olefines in the oxo-reaction and showed that in all cases the attack of the l-position is favoured. Industrial applications of his work on catalysts were made in European and S. American methanol synthesis plants.

'About 1938 his studies of synthetic rubber manufacture were important. Especially he worked on butadiene production and its separation from other C_4s by extractive distillation. The pioneer plant at Serrara was based on his calculations'.

Sir Robert did not suppose that the medallist would claim that he had made sterically ordered polypropylene (or later polystyrene) on purpose in the first place. What was much more important was that he recognized, by use of physical methods, what had happened and that later he had covered the whole subject as an umbrella covers a mushroom. This had involved the establishment of different classes of polymers and naturally finding out how to make them and how to examine them.

'Polypropylene made with crystalline $TiCl_3$,' continued Sir Robert, 'is termed *isotactic* by Natta because it is found that all or most of the -CHMe- groups are oriented in the same sense, in a helix. Another kind of regular arrangement is termed *syndiotactic* and the haphazard type is called *atactic*.

'It was an obvious extension to attempt the synthesis of optically active isotactic polymers and Pino succeeded by the use of optically active monomers in the acrylic series. True asymmetric synthesis from inactive units has recently been accomplished by Natta using an optically active catalyst and pentadiene. This is a remarkable achievement and the first example of asymmetric induction in the formation of a macromolecular hydrocarbon'.

Referring to poly-*cis*-butadiene, Sir Robert declared that Natta had made it of exceptional purity, such that it became crystalline on stretching in the cold. The disentangling of patents in this field would be splendid grist to the lawyers' mill, but there was no question of the value of Natta's contribution.

Dealing with recent developments, Sir Robert referred to ethylene-propylene copolymers and then said: 'This year in Montreal, Natta contributed a paper on the use of olefines in general, with the double bond in other than the α-position, in polymerization processes. Again a novel break which is still too early to assess'.

After the medal was awarded by Sir Edward Beharrell, Alan T. Pickett, editor of *Rubber and Plastics Age*, proposed the toast of the guests, Maldwyn Jones (I.C.I.) and Dr E. R. Rowzee (president and managing director of Polymer Corporation, Canada) responding.

THE MEDALLIST

Giulio Natta, who has won world-fame for his work on olefine polymerization, was born in 1903 and took his Doctorate in Chemical Engineering in 1924. This was followed by the Libero Docente of the Politecnico, Milano, three years later. His first Chair of General Chemistry was at the University of Pavia (1933-35), followed by that of Physical Chemistry at the University of Rome (1935-37) and of Industrial Chemistry at the Politecnico, Torino (1937-38). In 1938 he returned to the Institute of Industrial Chemistry at Milan and is now the Director of that Institute.

1961 Horners Award

THE British Plastics Federation is again this year organizing a competition for the Worshipful Company of Horners to encourage young craftsmen to produce good designs in plastics.

An award of 100 guineas is being offered for the most striking design for an article suitable for commercial production wholly or mainly of plastics.

The judges say that they will be looking for artistic merit, originality and practicability of design, as well as the suitability of the plastics materials specified for individual entries.

The competition is open to all those living in Great Britain or Northern Ireland who are under 35 years of age on December 1 1961.

Copies of the regulations and entry forms can be obtained from the British Plastics Federation, 47-48 Piccadilly, London, W.1. The competition closes on December 1 1961.

Dayco Rubber (UK)

The Dayton Rubber Co. Ltd. of Dundee, Scotland, has changed its name to Dayco Rubber (UK) Ltd. There is no change in the management.

The firm manufactures textile accessories and vacuum hose. It recently introduced two new lines to the printing trade: Dayco Gold Seal blankets and Daycollen rollers.

Polymer Science Courses

A comprehensive series of post-graduate lecture courses on physical aspects of polymer science will take place during the coming session at Borough Polytechnic, Borough Road, London, S.E.1.

The series of courses consist of six separate consecutive courses, each of five lectures. Each small course covers a broad interest field and is available for separate registration. The fee for the whole course is £6 and for each small course £1.

The courses, which will take place on Monday evenings from 6.30-8.30 are as follows:

Course 1. Addition polymerization kinetics — commencing October 23; Course 2. Polycondensation kinetics and degradation of polymers — commencing November 27; Course 3. Crystallinity and orientation — commencing January 22; Course 4. Thermodynamics and statistical mechanics — commencing February 26; Course 5. Plasticity, elasticity and mechanical behaviour — commencing April 2; Course 6. Determination of molecular size and shape — commencing May 21.

Further details and application forms are available from the secretary at the address given above.

Rubber Thread in N. Ireland

Production of covered rubber thread by two adjoining factories employing 400 workers and covering 70,000 sq. ft. on the Carnmoney industrial estate, near Belfast, has recently started.

The extrusion of rubber thread will be carried out by Stretchables International Ltd., a new company jointly owned by Clutsom and Kemp Ltd., and Darlington Fabrics Corporation of New York. The covering process will be carried out by Elastic Yarns Ltd., a subsidiary of Clutsom and Kemp who recently concluded an agreement with the Darlington Fabrics Corporation under which the British and US firms will pool their technical knowledge and experience.

Common Market Order for Semtex

Semtex Ltd., a Dunlop subsidiary, is despatching an order totalling over 1m. sq. ft. of thermoplastic floor tiling to one of the Common Market countries. The tiles have been manufactured to a special size and style, involving the making of a special tool and adjustments also to other plant and equipment.

The first consignment left Brynmawr on Friday October 6.

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VIEWS *and* REVIEWS

IF you are like me, it takes you some time to catch up on the reading you missed during your summer holiday. In order not to lose some of the good things in it, I will make my comments briefer than usual.

Compounding by Contour

In the June 1961 issue of *Rubber World*, volume 144, No. 3, pp. 75-81, P. F. Bertsch, who is already the author of a number of mathematical papers, describes a simple method of graphical analysis, especially applicable to demonstrating the relationships between compounding ingredients and the physical properties of the vulcanizate.

For instance, on one graph with axes of, say, accelerator and sulphur percentages, it is possible to draw 'contour lines' for, for example, 10%, 20%, 30%, 40% and 50% compression set, and also for 1,500, 2,000 and 2,500psi tensile strength, and 250%, 300%, 350% and 400% elongation at break.

Such a graph shows at a glance the possible combinations of sulphur and accelerator which will give a desired set of properties, *e.g.*, over 1,500psi tensile strength, over 300% elongation, and less than 30% compression set. As one of the contours could always be the cost, it would be possible to select at once the compound giving the desired properties at the lowest cost.

Obviously, the whole scheme is a simple, visual representation of a statistical process, and the author sets out simply some of the statistical background and possibilities of the technique.

Non-Sulphur Vulcanization

In the same issue of *Rubber World*, on pp. 100-101, is given a summary of four papers read at a meeting of the Philadelphia Rubber Group, on four non-sulphur vulcanizing systems.

Peroxide Vulcanization

L. O. Amberg 'explained that two of the major fields for peroxide cures are in cross-linking saturated polymers such as ethylene-propylene and vinyl acetate polymers, and in curing polyethylene'.

One group of peroxides (which includes benzoyl peroxide and most of the hydroperoxides) is easily affected by the presence of other substances, such as carbon black, metal oxides, and amines, so they are not of general interest as vulcanizing agents to the rubber industry. But there is another group (including di-tert-butyl peroxide and dicumyl peroxide) which decompose under heat to give active, free, cross-linking radicals.

The author explained some of the differences in procedure between sulphur- and peroxide-curing, and the side effects of common compounding ingredients.

Magnesia Vulcanization

A paper by W. H. Deis concerned the curing of halogenated rubbers with MgO. In neoprene it not only induces cross-linking but also acts as an acid acceptor and as a peptizer; it improves ageing and reduces scorch.

MgO also acts as an acid acceptor when used for curing Hypalon, and removes hydrogen fluoride from the fluoro-elastomers. In chlorobutyl mixes it is an acid acceptor and reduces scorch particularly in the presence of the right proportion of MBTS.

Sulphur Donors

R. T. Zimmerman discussed TMTD and TETD which, with zinc oxide and a fatty acid, give quite a fast cure.

Respectively, they have 13% and 11% available sulphur, and he theorized that the single atoms of sulphur that they donate may react with more terminal bonds than does elemental sulphur, thus reducing the possible points of oxygen attack. Further improvement of the same kind results from some direct carbon-carbon bonding arising by the free radical mechanism.

Zimmerman discussed several other sulphur donors of modern commercial significance and also outlined the history of sulphur donors, beginning with sulphur monochloride, including the Peachey Process, and the use of thiocyanates and thiosulphates, which have found but little use. There are many others, only of theoretical interest.

Resin Curing of Butyl

P. Viohl dealt with condensation resins of several kinds which vulcanize butyl rubber by, he thought, chromane ring formation. Generally, acidic catalysts are needed, and this gives rise to disadvantages when textiles are associated. This has led the US Rubber Co. to the development of a chloro-methylolphenol which will vulcanize butyl rubber at a practical rate without requiring an acidic catalyst.

Film Formation

Rubber World for June reported also, on pp. 102-3, four papers read at Boston in a Short Talks Symposium. Two concerned polymer films.

W. F. Scheufele discussed 'The Mechanism of Film Formation from Latices'. Particle size, nature of the surface area, and distribution of emulsifiers are all factors. 'Smaller particle size produced higher consolidation indices for vinyl acetate polymers and copolymers, but time-dependent changes occurred with acrylic and styrene-butadiene copolymer latices, indicating cross-linking took place'.

In ester-type polymers, degree of consolidation of the film correlated with hydrolysis resistance. It is possible that some emulsifiers form 'islands' in the film. The nature and surface of the substrate can also radically modify the film.

N. Wolff spoke on 'Water-soluble Polymers in the Surface Coating Industry', and especially about using them in conjunction with latices to improve the film. Naturally, an outstanding need is to improve their resistance to water, which means that cross-linking is desirable.

'The future of this field lies in development of room temperature cross-linking of these films, and the speaker was confident that before long such finishes would replace the solvent and the latex-based types'.

COMMENT ON SCIENTIFIC AND INDUSTRIAL MATTERS

by **F. C. JENNINGS**

Tyre Cord

'It seems certain that the two fibres (rayon and nylon) will not be the only ones in the field (of tyre cord) much longer', says *Rubber World* for June 1961, pp. 124-5, at the beginning of a survey of the present situation in the USA.

The newcomers, polyester fibres, are water repelling and basically have a good deal of the high strength and bruise resistance of nylon without the disadvantage of high 'growth', which, though counteracted to some extent by high temperature shrinkage, does result in flat spots.

Adhesion to rubber is said to have been solved by Goodyear, and prices will come down with quantity production.

In the further future are the polyolefin fibres, which are lighter than nylon, cool running, and can be made stronger than the polyesters.

Stick-to-it-iveness

For that word I am indebted to an advertisement by AMSCO, the American Mineral Spirits Co., in the *Adhesives Age* for June 1961. It can also denominate the unfortunate habit of mind of sticking-too-longishness.

Fifteen or 20 years ago, our own RABRM — as it then was — did some valuable work on the mechanism of adhesion between rubber and textile fibres, ascribing the main effect to a mechanical entanglement of surface fibres in the other party to the sticking. (I hope I am not paraphrazing too carelessly.) Simple, almost obvious, as the idea was, it is still ringing round the world.

In the TAPPI 'Adhesives for Coating' Conference held in Buffalo, USA, earlier this year and reported in the June 1961 *Adhesives Age*, the first paper dealt with the 'hooking' effect of embedded fibres, a better explanation than the existence of a specific adhesion between glue and fibre. The second sought to explain the importance of 'geometric factors' especially of very thin layers. This seems to me just stick-in-the-muddity.

I was far more impressed the other day by my local village ironmonger, who provided me with a tube of adhesive which stuck a glass knob on to my car window. To stick glass to glass strongly enough to resist considerable shearing force in opening and closing the window is, I think, a great achievement in stick-to-it-iveness.

Sole Sticking

In the *Adhesive Age* for March 1961 there was a paper by A. W. Niconchuk, of United Shoe Machinery Corporation, which appeared to be on the same theme of whisker stick. It had the title 'Testing Adhesives for the Vulcanized-on-Sole Process', attractive in itself but spoiled by the editorial sub-titling, which said: 'An extensive adhesive study reveals that proper roughening of the uppers is the best way to ensure a good leather-to-rubber bond'.

It did not seem to me to need an extensive study to show that. Yet, the paper was better than its sub-title. The investigation was quite an involved one — there are so many variables.

Eight main factors had to be considered, including the varieties of leather, of soling rubbers, of processes and products, of adhesives, and the lack of suitable testing methods.

The research team was unable to confirm the many claims to versatility in adhesives. 'Proper roughing is probably the greatest single factor for insuring a good bond between leather and rubber. . . . This procedure removes the finish and grain surface, exposing the fibrous part of the leather'.

As so often, they were up against the problem of relating laboratory test data to actual wear tests, but any method of making relative comparisons is valuable. They found the Satra tester useful, and also their own 'Torture Flex Tester'. These and other laboratory tests were supplemented with actual wear tests with work shoes and children's shoes.

Leather Goes First

The general evidence from the wear tests was that failure of the shoe was due never to the rubber sole, very rarely to the adhesive, but to failure of the leather upper.

Fast-curing, thermosetting adhesives were found to be best. Maximum bond strength results when the wide margins are roughed to expose the soft, fibrous layer of the leather. Two coats of adhesive, with adequate drying intervals, give the best bonds.

There were other useful conclusions, more than were indicated by the sub-titling.

British Comparison

The results obtained from an 'amateur' testing of children's shoes having leather uppers and moulded-on rubber soles and heels were, as far as can be judged, somewhat different.

Which? for September 1961 reports on tests made by the Consumers Association Ltd. on 11 well-known brands of such shoes. Two of the brands had the moulded sole-and-heel unit cemented on to the upper, and on one of these two it was also riveted at the toe. Only one of the 11 had a microcellular rubber sole.

The tests were concentrated on the two major factors of fit and wear, and some help from SATRA is acknowledged.

The wear trial was carried out with 46 boys at an orphanage. A preliminary trial to separate the 'heavy wearers' from the 'light wearers' enabled them to be spread evenly in the main trial which followed.

Each of the 11 brands was tested on four boys, except one for which six boys were used, making 46 in all. The trial was for 15 weeks with an intermediate inspection after a month, the test shoes being worn every day. Wear was assessed for 17 different factors by a shoe technologist and an experienced fitter.

Faulty Stick

The results, in brief, were that 26 of the 46 pairs were unserviceable after the 15 weeks' wear, one or more component needing repair.

The outstanding defect was sole separation, 15 shoes from 11 pairs proving defective in this way. Next came sole wear, with 12 defective shoes from nine pairs. Thirdly, heel wear was responsible for seven defective shoes from six pairs. Four other component defects were together responsible for six defective shoes from six pairs.

There was scarcely any heel separation. The microcellular rubber soles did not wear so well as the solid rubber soles.

CHARLES JENNINGS.

MEN *and* MATTERS

A Review of People and Events

by Peter Richards

IT is becoming more and more difficult to separate technical problems from their commercial implications. I was very interested to see a move this week to tackle this problem.

Dr C. A. Redfarn, the consultant, and Aubrey Wilson, a leading industrial marketing research consultant, have formed a new organization to provide a comprehensive commercial and technical service.

The new organization — Technical-Commercial Surveys of 1 Dover Street, London, W.1 — will deal with, apart from technical surveys and consultancy, research into industrial markets at home and overseas, product diversification studies, application studies and product and price intelligence services.

Nineteenth Hole Nylon

You may remember that earlier this year I told you about a nylon airhouse at the Old Trafford test match. Now another sport has taken up this handy form of accommodation. An airhouse is being used as a refreshment marquee at this year's Ryder Cup tournament.

Unlike a conventional marquee it has no supporting poles or guy ropes. The skin of tough but lightweight coated nylon fabric is held up solely by a constant supply of low-pressure air from powerful fan units. Iron stakes keep it tethered to the ground and it remains stable even in high winds.

The airhouse at St. Anne's measures 100ft. by 40ft. by 20ft. and was manufactured by The Gourock Ropework Co. Ltd. of Port Glasgow.

Recently a house was built underneath an airhouse, enabling work to go on without any bad weather delays. Another was used as a temporary television studio. Other uses include anything from temporary warehouses to emergency hospitals.

Goodyear Streamlining

Changes designed to streamline the working framework of its general products division, under the control of K. H. Johnston, were recently announced by Goodyear (GB) Ltd.

The industrial products division — manager J. T. Pearson — with headquarters at Wolverhampton, has now been strengthened by the appointment of two marketing supervisors, W. R. Quick (hose products) and H. F. Escott (belting).

The department previously called films and adhesives has now been renamed special products division, under manager G. R. Barnett, and will control marketing and sales of films, adhesives, flooring, counter topping, printer's supplies and fibre glass products.

Extrude, Evacuate, Puncture

Evacuated seals which speed up, simplify and reduce the cost of glazing and curtain wall installations, were used in the construction of a new radio and television centre in Stockholm, Sweden. One of the results was that 10,000 working hours were saved in the construction of this ultra-modern building.

This advanced sealing technique was developed by Swedish engineers using neoprene. The seals consist of hollow extrusions — plain tubing in its simplest form, which is first evacuated, then fitted into the desired position and punctured or cut to allow air to enter so that the tube expands and forms a tight seal. Where special jointing is required, 'tailor-made' sections can be manufactured.

In the Stockholm building EFAB seals were used for the concrete blocks, curtain wall panelling, internal joints between wall elements and external glass panels. Altogether 381,000ft. of neoprene seals were installed in this building, which is 640ft. long and 72ft. high.

Black to White

Some industrial films make me squirm. They are loud, brash with brassy music fighting the commentator, and they often maul a good subject by trying to sell too hard.

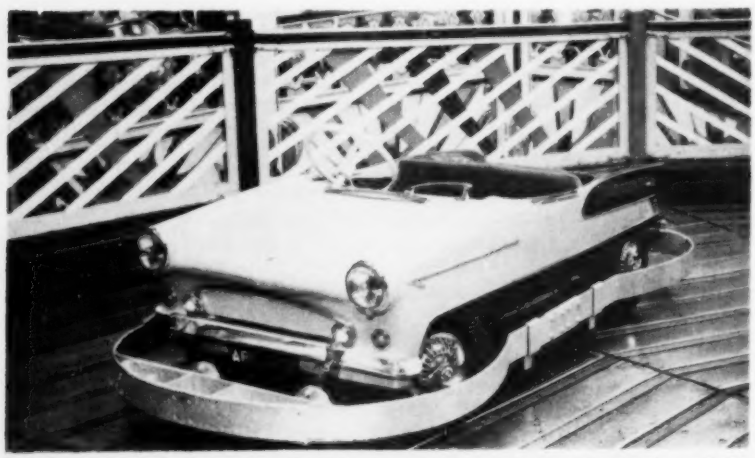
None of these complaints could be made against a new film from Laporte Titanium, which had its first showing in London recently. The film follows a consignment of black ilmenite from Norway to Laporte's Stallingborough factory, where by 25 processes it is transformed into the whitest pigment known — titanium oxide. Crisp camera work and a non-intrusive commentary conveys how meticulously process control is carried out.

The only criticism I have is that this is one of those films where it is easy to lose the sequence of operations when moving from one process to another. A diagrammatic explanation of the sequence at the beginning of the film would have helped.

The film will be shown to commercial and technical audiences from the rubber, plastics, paint and other industries this winter, starting at Aberdeen (October 24), Edinburgh (October 25) and Glasgow (October 26).

Alec Page Retires

Alec Page retired from BTR Industries last week. In his 40 years with



Built to be knocked about, this Dodgem car is a graphic illustration of the toughness of reinforced plastics. Bakelite polyester resin was used, reinforced with four layers of Fothergill and Harvey's 2oz. Tygamat

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the company he played a very important part, both in the factory and in the field, in the promotion of BTR rubber footwear.

In August 1922, Mr Page, who was born in Norwich, joined C. W. Randall and Co. Ltd. — at that time sole agents in the UK for the Hood Rubber Co., of America — as manager of the tyre department. Five years later he became responsible for footwear sales in the Eastern Counties. On the cessation of the import and sale of Hood tyres in 1930, Mr Page was appointed footwear sales superintendent in the Midlands and Eastern Counties. During the same year BTR commenced the actual manufacture of rubber footwear — including the well-known Hood 'Bullseye' boot, which it was then impossible to import from the USA. In 1958, C. W. Randall and Co. Ltd. became the footwear division of BTR.

Alec Page is a very well-known figure in the world of bowls. This year he received the highest honour in the sport when he was elected president of the International Bowling Board.

He has been succeeded at BTR by his son, Eric Page, who has been employed by the group as a footwear sales representative for the past 16 years.

The export sales manager of the Evode Group, S. B. Knowlden, is now visiting East, West and Central Africa. He is concentrating on Nigeria, Ghana and Sierra Leone

Proofed tulle is used in a swim cap for the first time. Layer upon layer of tulle is mounted on a rubber base to form this Kleinert cap — one of the company's 1962 collection

Foot Featly next Friday

The younger members of the London section of the IRI should be 'footing it featly', in John Betjeman's phrase, next Friday (October 20).

The section's autumn dance looks like being a lively evening, since it has been organized mainly for the younger people in the industry. If you haven't bought your ticket yet, there are still some available (7s. 6d. each) from the IRI at 4 Kensington Palace Gardens, London, W.8. The dance is being held at the Victoria Halls, Bloomsbury Square, W.C.1 (North Hall Suite).

Phone for Plastics

More people are phoning the Distillers Plastics Group. For the fourth time in three years it has extended its telephone service. The latest improvement has been to install a comprehensive telephone system under a group number — Hyde Park 8131 — at Devonshire House.

Appointments in Brief

William H. Rigg has been appointed managing director of Firth Cleveland Tools Ltd.

* * *

Peter Seary has been made head of a group concerned with the design and application of packaging, in the packaging division of the Reed Paper Group. Mr Seary will work with the development department of the division and will be based at its New Hythe centre.

THE LEGAL ANGLE

Perils of Expense Accounts

By a Barrister

WHEN anyone is appointed a company executive, it is inevitable that he will incur expenses in the course of his duties. But what is not inevitable is that those expenses will be allowable when income tax comes to be assessed.

A company's employees — from the lowly cleaner or labourer to the mighty managing director — come under Schedule E. They are employed persons. The only expenses which will be allowable are those incurred wholly, exclusively *and necessarily* for the purpose of the business. But those of us who work for ourselves — perhaps as one-man concerns, free lance representatives, public relations consultants and the like — we come under Schedule D — and are entitled to deduct expenses incurred wholly and exclusively for the business — whether those expenses were 'necessary' or not.

The importance of this distinction was greatly enhanced by a recent case which you may have read about. A bank manager was required by his company to join an exclusive club, and he put down his subscription as an expense. It was held that while he would never have joined were it not for his occupation, and while it could truly be said that the expenses on joining were incurred 'wholly and exclusively' as a result of his employment, it was not 'necessary' for him to be a member, to carry out his duties as a bank manager. So he lost his case — and his membership expenses were not deductible

And now, of course, all those executives who are members of sporting, social and other clubs and who have been accustomed to put their membership fees down to expenses, may find themselves in trouble. True, if they can convince the tax authorities that their best sales are made on the nineteenth hole, they may get away with it. But they will have to prove that their membership was really necessary.

But those who are on Schedule D will remain unaffected. Necessity is not the keynote of their expense allowances. Lucky people. . . .

PLASTICS MACHINERY DEVELOPMENTS

Small Injection Moulding Machines

THE NEW STANDARD AUTOMOULDERS

By JOHN SHEARING

IN the general eagerness to consider bigger machines, preferably with screw preplasticization, we tend to forget that small injection moulding machines serve a very useful function and are continually being developed. A reminder of this came from Omni (GB) Ltd., the sole UK distributors of injection moulding machines made by the Standard Tool Co., of Massachusetts. They have announced three new Automold injection moulding machines — models K2-50-50, K2-100-50 and K3-100-50.

These 2oz. and 3oz. machines are simply, efficiently and compactly designed, offering the greatest ease of operation and maintenance.

Higher Clamping Pressure

One of the outstanding features of all the new machines is the availability of 'more tons clamp per sq. ft. of floor space'. All the machines are completely self-contained with hydraulic systems and electrical controls. Rugged construction is an important advantage and very fast production has been achieved. All these features are a reminder that much can be achieved on the small diameter machine without the use of preplasticization techniques.

A detailed specification of each of the machines is given in Table 1. Features which should be noted include the closing force, the plunger stroke, the plasticizing capacity and the dry run cycles per hour.

The 2oz. Machines

The K2-50-50 is a 50 ton clamp machine, completely self-contained with a 10hp dual pump drive. A large capacity pump handles the machine while the cylinders are in motion, and a smaller pump takes over when motion is stopped.

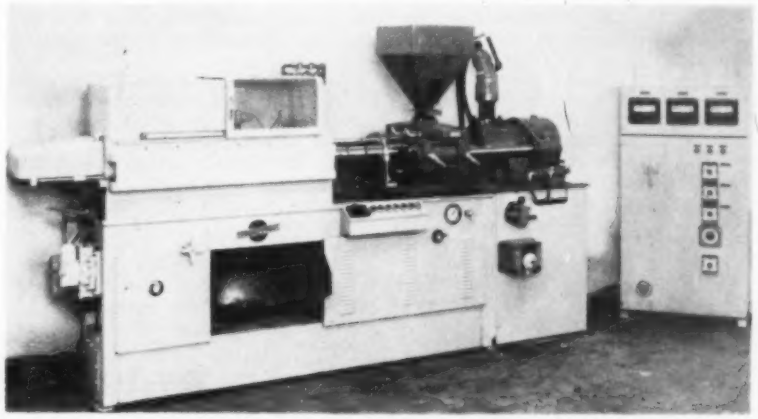
The hydraulic system is a straight 2,000lb. single pump system with accumulator bottles. The 20hp motor results in very fast cycling.

All the controls are readily accessible on one panel, a further example of this commendable development. In the case of the 100 ton clamp machine, however, it can be ordered with electrical or cam-operated controls with a choice of 6¾in. or 9in. stroke.

In the case of both machines, optional extras include low pressure closing equipment and heat control for hot runner moulds. In the case of the 100 ton clamping unit an extra accumulator bottle can be provided.

The 3oz. Machine

The K3-100-50 machine has an engineering degree of excellence normally expected with larger machines. Exceptional features of the machine which should be noted are as follows: The hydraulic clamp pressure is 100 tons and the mould set up is simple, fast and with no adjustments required for die height. There is an air-sweep which is designed to clear all die areas of excess particles, the retention of which is a common cause of rejects in machines without this feature. A quick and easy purging of the entire injection assembly and assured nozzle control results from mechanical hand lever pullback.



One of the new Automold injection moulding machines — all of which are completely self-contained with hydraulic systems and electrical controls

A volumetric feed control is standard equipment and is adjustable to a very fine tolerance. Pre-pack of the injection cylinders is controlled by a counter for the desired number of strokes.

The control cabinet is mounted in a console kept at the side of the machine. It can be equipped with a third pyrometer to control hot runner moulds which eliminates the need for a separate attachment. The three control timers, the signal timer and the heat control instruments are of the plug-in type for ease of maintenance and fast replacement.

A deficiency of many injection moulding machines and extruders in the past has been the use of guesswork for controlling water cooling of the machines and moulds. An important feature of the automolders,

Continued on page 587

TABLE 1

SPECIFICATIONS OF STANDARD TOOL CO. AUTOMOLDERS

Feature	*K2-100-50*	*K2-50-50*	*K3-100-50*
Shot size (oz.), polystyrene	2	2	3
Plasticizing capacity (lb./hr.)	30 or 40	30 or 40	45
Plunger diameter (in.)	1¾	1¾	1¾
Plunger stroke (in.)	5	5	6
Rate of travel (cu.in./sec.)	6.5	6.5	6.5
Pressure on material (psi)	14,200	14,200	20,000
Hopper capacity (lb.)	125	125	125
Closing force (ton)	100	50	100
Minimum mould thickness (in.)	9 and 6	6	9
Maximum stroke (in.)	9 and 6¾	6¾	9
Mould size (in.)	9 × 12	9 × 12	12 × 15
Cycles per hour, dry	2,000	2,000	1,500
Floor space (ft.), L.W.H.	10 × 3 × 6	8 × 3 × 6	10 × 3 × 6

Plantation Newsletter

MORE RUBBER FACTORIES FOR SMALLHOLDERS

by our Malayan Correspondent

FROM KUALA LUMPUR

MALAYA'S Rural and Industrial Development Authority plans to build more rubber factories throughout the country to help smallholders. They will be built on similar lines to the RIDA-owned rubber factory at Grisek in Johore.

This factory, opened two years ago, has proved to be most successful and it is now proposed to build others in Selangor, Pahang, Trengganu, Kelantan, Kedah, Malacca, Negri Sembilan and a second one in Johore.

The first of the new factories will go up in Selangor. Tenders have now been called for the building of a rubber packing shed, a rubber processing factory building and a smoke house. It is hoped that this factory will be completed early next year.

Meanwhile, the Selangor Government in central Malaya has acquired about 1,500 acres of rubber land, nine miles south of Kuala Lumpur, for incorporation into a new industrial site. For some months now, the Federal Government has been looking around for a suitable area where a second new town can be built.

Petaling Jaya, the first new town, seven miles west of Kuala Lumpur, is now full. It covers more than 4,000 acres (formerly rubber land), accommodates 50,000 people in new homes and has 50 factories in its industrial section.

There are still another 126 applications from industrialists waiting to establish secondary industries in Malaya and the vast majority are keen to build near Kuala Lumpur because of the facilities in the way of road and rail communication, power and water, that are available. The 1,500 acres just bought are not planted with high-yielding rubber.

Appeal to Complete

The Rubber Research Institute has appealed to planters to complete questionnaires which are sent to them. Usually only between 60 to 70% are returned. Occasionally the response is well below this level.

The latest issue of the Planters' Bulletin of the RRI reviews the planters' conference held here in July, the first since 1938, and devotes the whole issue to an almost verbatim report of the discussions.

Certainly one of the most important topics raised was the problem of wind damage. Stress was made on the need for care in manuring wind susceptible trees, and it was suggested that on fertile soils manuring of leguminous covers may be reduced at the time when they were shaded out, since the covers themselves returned large quantities of nitrogen and other elements of the soil.

'In connexion with wind damage and indeed with many other problems, planters are asked to help the RRI by supplying information. We look forward to the day of the 100% return of questionnaires', said the editorial.

On tapping and yield stimulation it was pointed out that there was a need for a more intensive inquiry into the profitability of various tapping systems, and indeed of all managements systems.

The standard of comparison most frequently mentioned at the meeting, were yield per acre and yield per tapper, but the problem of how to strike the correct balance between these two measures of output remains to be solved.

Chan Jan Jee's paper on tapping systems and yield stimulation on three estates contained novel and, indeed for many planters, revolutionary statements. Mr Chan's records of task size (larger than usual) and of girth at opening (smaller than usual) were of special interest.

As the Planters Bulletin commented: 'The debate on these topics is likely to continue and, as in the case of assessing the profitability of tapping systems there is an evident need for professional economists to investigate the consequences of variations in task size'.

Mr de Jonge, in his paper on tapping of young rubber, supported the hypothesis that reducing tapping intensity in another way — by introducing periodic resting periods — would lead to an improved girthing and so might provide a partial solution to the problem of alleviating wind damage.

On the subject of yield stimulation, Mr de Jonge stated that the systems recommended at present were not too intensive, and quoted a recent experiment showing that stimulants could be applied at three-monthly instead of six-monthly intervals without inducing undesirable effects in the trees.

In the discussion on the control of weeds and root disease, points of RRI policy and progress were given prominence. Work continues at the Institute on the task of finding alternatives to sodium arsenite. Many new chemicals show promise as herbicides, but all are comparatively expensive.

The nature of the changes in the Institute's advice on root control was also explained. It was made clear that there was a possibility of eliminating the major root diseases now that improved methods of treatment were known and the importance of preventing the colonization of moribund stumps by fungal spores was realized.

The RRI said that it hopes the report on the conference would inspire planters to start now on the evaluation of estates records which may eventually provide material for the technical papers on which the success of future conferences would depend.

Rubber Statistics

FRANCE — JAPAN — THAILAND

FRENCH rubber consumption in June 1961 was 21,178 tons, compared with 19,548 tons in May and 19,652 tons in June last year. Stocks stood at 29,816 tons, compared with 30,044 tons at the end of May and 30,146 tons at the end of June 1960, according to figures issued by the French Ministry of Industry and Commerce. The Ministry gave the following details (in metric tons):

	June	May
CONSUMPTION		
Natural	10,967	9,937
Latex	1,226	1,169
Synthetic	8,985	8,442
Total	21,178	19,548
SYNTHETIC BREAKDOWN		
Butyl	1,196	1,110
SBR	6,389	6,052
Others	1,110	1,010
Synthetic latex	290	270
Total	8,985	8,442

Stocks at the end of June were 29,816 (May figure was 30,044), 15,725 tons being natural, 1,881 latex and 12,210 synthetic. The synthetic figure included 7,675 tons of SBR and 2,213 of butyl.

Japan

The Rubber Manufacturers Association has announced that the production of rubber articles during August amounted to 19,551 tons, compared with 19,598 (revised) tons in July.

Production details for the main articles were: motor tyre/tubes 9,426; bicycle tyre/tubes 688; rubber soled-canvas shoes 980; rubber shoes 1,330; belts 1,274; and industrial uses 2,548.

Thailand

Thailand exported 24,836,265 kilos of rubber of all grades in July, according to trade estimates. This compared with 9,380,805 kilos exported in June this year and 7,579,213 kilos in July 1960.

Main destinations during July were: Japan 6,024,528; USA 4,931,893; UK 3,854,594; West Germany 2,813,395; USSR 2,781,475; Malaya 1,868,050; Singapore 1,104,845; Holland 391,089; Italy 354,680; Czechoslovakia 279,414; Poland 152,410; France 142,588; and Norway 101,606.

Electrical Aids in Industry — Data Sheet **20**

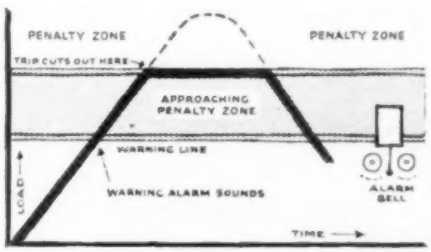
Load Factor Improvement

Most industrial electricity tariffs consist of a fixed charge based on the maximum demand for electricity by the works and a running charge for each unit (kWh) of electricity used. Broadly speaking, the fixed charge covers the capital cost of generating, transmitting and distributing equipment for the particular demand and the running charge covers the cost of generating the units.

Thus, if the factory maximum demand is reduced for the same level of consumption or is held constant for an increased consumption, the cost per unit will be reduced. This is termed improving the 'load factor': load factor being defined as the ratio of the number of units supplied during a given period to the number of units that would have been supplied had the maximum demand been maintained throughout the period; it is usually expressed as a percentage. Some ways in which load factor can be improved are:

SUPERVISION AND CONTROL OF MAXIMUM DEMAND

A maximum-demand alarm gives a warning when the maximum demand is about to be exceeded. One of the simplest devices has two warning contacts, but, as a useful addition, an auxiliary relay can be supplied so that non-essential load can be tripped automatically.



The Load Limiter, an automatic device, meets the requirements of medium and large consumers who wish not only to control their system loading to some target maximum but also to improve the load factor in order to increase the overall economy of the plant.

EXAMPLES OF REDUCTION IN MAXIMUM DEMAND

Broadly speaking, loads which contain some storage element can be transferred from on-peak to off-peak times. Examples are: charging electric batteries used in industrial trucks and road vehicles; pumping loads in drainage schemes; water pumping in quarries, gravel pits and other open-air workings; large cold-storage warehouses; ice-making factories in which cost of power is a sufficiently large item of the operating expense to make a reduced charge acceptable.

Many processes at times of peak demand can, under controlled conditions, tolerate a temporary reduction, or even cessation, of supply without any serious effect on the product. With electro-chemical processes such as in the manufacture of hydrogen peroxide no difficulty arises from periodic interruptions at short or even no notice.

In a plastics factory the management arranged for dies to be switched on by time switches one after another early Monday morning so at the beginning of work all dies had reached their operating temperatures. Previously they were switched on more or less simultaneously by hand when work started, resulting in an abnormally high demand.

In a certain chemical works compressed air is used for blowing out containers for plastic material. The nature of this operation is such that the consumption of air is spasmodic and irregular. The demand-recording meter in this works showed that the 18-kilowatt motor driving the air compressor was frequently cutting in on top of the factory load, thus incurring a higher maximum-demand charge. In this case all that was necessary was to ensure that the air receiver only required charging at night-time or at other off-peak times. It was found that the existing receiver had such a small capacity that the pump had to operate to recharge it almost every time the blowing operation took place. This small receiver was therefore replaced by a receiver of large enough capacity to maintain the blowing requirements over the peak periods without further charging.

EXAMPLES OF INCREASED CONSUMPTION FOR THE SAME MAXIMUM DEMAND

Often when the requirements of a factory are studied it is found that there are additional processes for which electro-heat can economically be employed because furnaces or other equipment can be arranged to be switched off or to take a reduced load during periods of peak demand. A sheet metal foundry with an early morning peak found that it would be an economical proposition to use an infra-red oven switched on after the peak period had passed because such ovens are ready for use in a few minutes. The possibilities of electric space heating in this respect are dealt with in Data Sheets 18 and 19.

For further information, get in touch with your Electricity Board or write direct to the Electrical Development Association, 2 Savoy Hill, London, W.C.2. Telephone: TEMple Bar 9434.

Excellent reference books are available on electricity and productivity (8/6 each, or 9/- post free) — 'Higher Industrial Production with Electricity' is an example.

E.D.A. also have available on free loan in the United Kingdom a series of films on the industrial uses of electricity. Ask for a catalogue.

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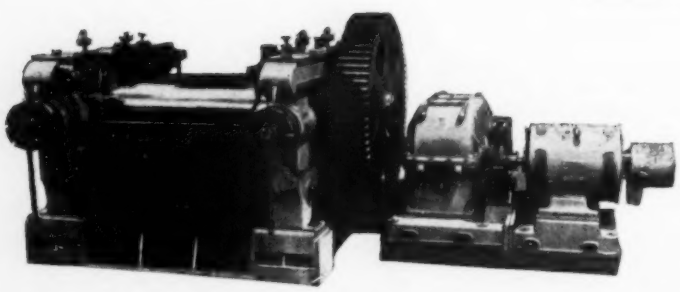

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Rubber and Plastics Stock Market

A REVIEW OF PRICES AND TRENDS

THE half-time profits of I.C.I. and the Bank Rate change. These were the two big events which caused a lot of excitement in the stock market during the past couple of weeks. From I.C.I. came news that the group's balance, before tax, for the first six months of the year, worked out at £36.7m. against £50.2m. Compared with the very good results produced in a similar period of 1960, they can be judged as poor. But this was indeed an exceptional period and when comparison is made with the second half, one arrives at the conclusion that they are reasonably satisfactory.

What of the outlook for the rest of the group's trading year? In the first instance, there is every reason to think that the effects of the Chancellor's 'little budget' will be something of a restraining influence. Then there is the problem of further price cuts to come in the varied fields which this massive combine covers. At the start of the current half year, reductions in selling prices of both fertilizers and terylene staple fibres took effect. On top of these substantial cuts ranging from 14% to 18% were announced for polythene. These moves are as a direct result of increasing competition, in particular from overseas sources, rather than to any cut in I.C.I.'s production costs.

Looking even further ahead, however, I see no reason why the company should not be able to keep up its post-war razzle-dazzle which has made millions for shareholders and the employees who qualify for the annual hand round of free shares. At present 40% of the group's exports are to the European market. In the controversial Common Market itself sales tot up to an impressive £20m., although these account for a modest ½% of all chemical business, as against 50% in this country. Any kind of an increase in this the world's largest and fastest-growing chemical market, would work wonders and certainly alter the outlook considerably.

As far as City circles were concerned the cut in Bank Rate from 7% to 6½% came as a big surprise. It came just at the right time for share prices which passed through another unsettled phase before the change was announced. Not that such a minor adjustment means anything except that the powers that be consider that the immediate headaches of the balance of payments problem have passed over. Those companies with big overdrafts must have sighed with relief. It has been estimated, for instance, that two of the big electrical leaders, AEI and GEC will save something in the region

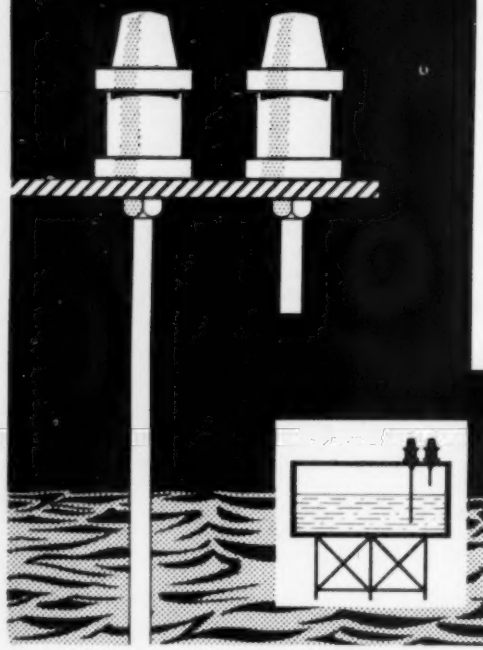
Continued on page 587

Share Price Movements

Par Value	Company	1961 High	Low	Sept. 30	Latest
£1	A.E. Ind. Ord.	48/6	29/3	35/-	30/3
5/-	Albright & W. Ord.	29/6	21/-	22/3	21/6
£1	„ „ „ 5% Pref.	17/3	13/-	13/-	13/-
5/-	Anchor Chemical Ord.	25/6	16/-	18/6	19/-
4/-	Airfix	33/6	17/-	64/3	33/6
4/-	„ Non Voting	29/-	16/-	59/6	29/-
5/-	Andersons Rub. Ord.	—	—	3/9	3/9
£1	Angus Geo. Ord.	83/-	58/6	66/3	68/9
5/-	Ault & Wiborg Ord.	17/-	12/9	14/9	14/9
£1	Avon India Rubber Ord.	46/6	30/-	36/9	37/6
£1	„ „ „ 6% Pref.	19/3	17/6	17/6	17/6
10/-	Bakelite Ord.	66/3	42/3	46/6	46/6
£1	„ 6% Pref.	19/3	16/6	17/3	17/3
£1	Baker Perkins Ord.	59/6	40/6	47/3	45/6
4/-	Bank Bdg. Rubber Ord.	3/6	1/9	2/3	2/3
4/-	Bettix	11/9	7/6	9/-	9/-
4/-	Brammer H. Ord.	17/-	13/9	13/9	13/9
10/-	Bridge, David Ord.	60/-	28/9	31/3	31/3
5/-	Bright, John Ord.	9/6	6/3	6/6	6/6
5/-	Brit. Blting. & Asb. Ord.	24/-	17/6	19/3	19/3
£1	„ „ „ „ Pref.	—	—	13/3	13/3
5/-	British Electronic Indus.	15/6	9/6	11/-	11/3
£1	BICC Ord.	62/6	49/-	57/6	56/3
5/-	BTR Ind. Ord.	18/9	8/9	9/9	8/9
£1	„ „ 7½% Pref.	21/6	19/9	20/-	21/-
10/-	Castrol Ord.	52/-	37/-	39/-	39/3
£1	Courtaulds Ord.	47/6	30/-	33/3	34/3
£1	„ 5% 1st Pref.	16/-	13/9	14/-	14/-
£1	„ 6% 2nd Pref.	18/3	15/9	16/3	16/-
4/-	Cow, P. B. Ord.	10/6	7/6	9/-	9/-
£1	„ „ 5% Pref.	14/3	12/6	12/6	12/6
1/-	Dannimac Mfg. Ord.	16/3	10/6	11/-	15/-
10/-	De La Rue Ord.	70/-	51/-	52/6	51/-
£1	„ „ „ 3½% Pref.	10/6	9/6	10/-	10/-
10/-	Distillers Co. Ord.	41/3	31/-	36/6	36/3
£1	„ „ 6% Pref.	20/3	17/-	17/3	17/6
£100	„ 5% Conv. Loan	£96	£90	£91	£92
£100	„ 5½% Unsec. Loan	£86½	£72	£73	£74½
10/-	Dunlop Rubber Ord.	29/-	21/6	26/-	26/6
£1	„ „ 5½% Pref.	16/-	13/9	14/-	14/3
£100	„ 3½% 1st Debs.	£69	£67	£68	£69
£100	„ 4½% 2nd Debs.	£79	£74	£75	£75
£1	Eng. Elect. Ord.	40/6	27/-	28/3	27/3
4/-	Ebonite Cont. Ord.	8/6	4/9	6/-	5/-
£1	English China Clays Ord.	117/6	80/-	96/9	98/6
£1	Goodyear Tyre 4% Pref.	11/6	9/9	10/-	10/-
5/-	Greeff Chem. Ord.	37/7	22/9	23/-	23/-
10/-	Greeff Chem. 5½% Pref.	8/3	6/9	7/-	7/-

Par Value	Company	1961 High	Low	Sept. 30	Latest
4/-	Greengate & Irwell Ord.	6/9	4/6	5/9	4/6
5/-	Hackbridge Hldg.	6/9	4/9	6/-	6/-
£1	Harrisons & Crosfield Dd.	57/6	47/6	48/-	49/-
1/-	Hunt & Moscrop Ord.	2/3	1/3	1/10½	2/-
£1	Imp. Chem. Ord.	81/6	58/-	64/3	60/6
£1	„ „ 5% Pref.	16/3	13/6	14/9	14/9
£100	„ 4½% Unsec. Loan	£83	£76¾	£77	£78
£100	„ 5½% Conv. Loan	£93	£85	£88	£87½
5/-	Laporte Ind. Ord.	28/9	18/6	20/3	18/9
£1	„ „ 7½% Pref.	23/-	20/-	20/-	19/6
£1	Leyland & Birm. Rubber Ord.	59/3	42/6	43/9	41/-
£1	„ „ „ 6% Pref.	18/9	15/-	15/-	15/-
2/-	London Rubber	15/6	9/6	12/9	13/-
£1	„ 6% Red. Cum. Pref.	20/-	16/9	17/6	17/6
£1	McKechnie Bros. Ord.	43/-	27/-	40/6	38/9
£1	„ „ 'A' Ord.	45/-	32/6	35/-	33/-
£1	„ „ 6% Cum. Pref.	18/-	16/-	16/6	16/6
5/-	Monsanto Chem. Ord.	27/6	14/9	16/6	15/3
£1	„ „ 3¾% Pref.	12/6	10/9	11/-	11/-
£100	„ „ 6% Debs.	£98	£88½	£89	£89
5/-	Miles (H.G.) Hldgs. Ord.	7/9	7/-	7/6	7/3
2/-	Movitex	7/6	4/9	5/-	4/9
£1	North British Rubber	21/3	11/6	12/6	11/6
5/-	Northwestern Rubber	13/-	9/-	12/-	12/-
5/-	Plastic Enginrs. Ord.	40/-	28/3	28/6	28/3
10/-	Projectile & Eng. Ord.	50/6	22/6	38/9	37/6
5/-	Redfern Holdings Ord.	4/-	2/9	3/3	3/9
2/-	RFD Ltd. Ord.	6/3	3/6	4/3	4/-
£1	„ „ 5½% Pref.	15/-	10/6	10/6	11/3
2/-	Rubber Imp. Ord.	6/3	3/3	3/3	3/3
2/-	„ „ 'A' Ord.	5/-	2/6	3/-	2/3
£1	„ „ 5% 1st Pref.	13/3	11/3	12/3	12/3
5/-	Rubber Reg. Ord.	18/3	13/6	13/6	13/9
4/-	Shaw Francis Ord.	24/6	13/9	13/9	14/3
£1	Shell Ord. (Reg.)	140/-	108/-	115/6	117/3
2/-	Silentbloc Ord.	10/6	8/3	8/6	8/6
5/-	Storey Bros.	46/-	34/-	35/-	35/-
2/-	Sussex Rubber Ord.	2/7½	1/9	1/9	1/9
5/-	Sutcliffe Speak Ord.	18/6	12/6	12/6	12/6
£1	Tootals	35/6	24/6	27/3	25/-
£1	Turner & Newall Ord.	78/-	55/-	61/3	59/6
£1	„ „ „ 7% Pref.	21/6	19/-	20/3	20/3
5/-	Universal Asbestos Ord.	27/-	20/-	21/3	22/9
£1	Venesta Ord.	76/-	57/6	58/-	59/9
5/-	Viscose Dev. Ord.	16/3	13/3	13/9	14/9
5/-	Warne W. (Holdgs.) Ord.	21/6	14/9	17/6	17/6

LECTRALEVEL



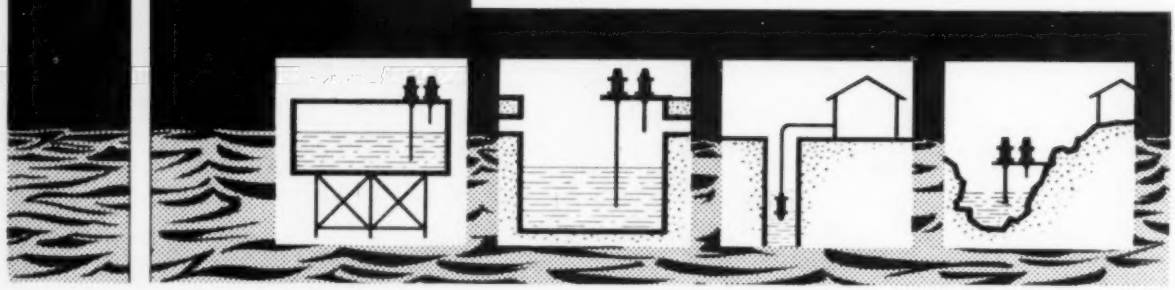
Floatless Liquid Level Control

Lectralevel is a system for controlling automatically the filling or emptying of tanks. Lectralevel employs a simple, reliable electro-magnetic circuit based on the liquid conducting a very small current. A variety of electrodes and holders is available to suit most liquids and conditions. Controls of this type have been in operation for over 20 years and require no maintenance.

Pump motors, valves, alarms, etc., can all be successfully controlled with Lectralevel.

Write for new fully illustrated booklet No. 94/R.J. which tells how to apply Lectralevel in your plant.

LONDEX *Anerley Works, London, S.E.20. Telephone: SYDenham 3111*



Selected books on

RUBBER and PLASTICS

ENGINEERING DESIGN with RUBBER
A. R. Payne, B.Sc., A.Inst.P., F.I.R.I. and J. R. Scott, Ph.D., M.Sc., F.R.I.C., F.Inst.P., F.I.R.I.
Rubber and Plastics Research Association of Great Britain
50/-
by post 52/-

SYNTHETIC RUBBER TECHNOLOGY
VOL. 1
W. S. Penn, B.Sc.
50/-
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ANALYSIS of RUBBER and RUBBER-LIKE POLYMERS
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Rubber and Plastics Research Association of Great Britain
20/-
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131 GREAT SUFFOLK STREET, LONDON, S.E.1. *Telephone : HOP 5712*

Rubber Markets

LONDON

Rubber prices eased gradually during a quiet week ending October 11 by up to ¼d. per lb., owing to continued easiness at Singapore. Traders said that lack of fresh buying orders was also a contributory factor for the downturn. They added that activity was largely confined to scattered routine shortcovering at the decline which was spread over the cif and landed markets. The ½% cut in the Bank Rate last Thursday failed to act as a stimulant to the trade.

Latest prices are as follows:

No. 1 RSS Spot: 24⅛d.-24⅜d.

Settlement House:

November 24⅛d.-24⅜d.

December 24⅛d.-24⅜d.

January 24⅜d.-24½d.

January/March 24⅜d.-24½d.

April/June 24½d.-24⅝d.

July/September 24½d.-24⅝d.

October/December 24½d.-24⅝d.

No. 1 RSS cif basis ports:

October 24⅛d.-24⅜d.

November 24⅛d.-24¼d.

Godown:

October 82 buyers (Straits cents).

LATEX

Centrifuged 60% latex per gallon in drums, seller, November, 14s., cif European ports. Spot, seller, 14s. 6d. Bulk, seller, d.w. 14s. 1d. Normal, seller, November, 11s. 1d.

NEW YORK

The New York rubber market ruled as under on October 9:

DEALERS' PRICES

	US cents per lb., ex-dock	
	Oct. 9	Previous
No. 1 RSS, Oct.	29⅛b–29⅜a	29⅛b–29⅜a
Nov.	29b –29⅛a	29b –29⅛a
No. 2 RSS, Oct.	29⅛b–29⅜a	29⅛b–29⅜a
Nov.	28⅞b–29⅛a	28⅞b–29⅛a
No. 3 RSS, Oct.	29b –29⅛a	29b –29⅛a
Nov.	28⅞b–29a	28⅞b–29a
No. 1 RSS, Spot	29⅛n	29⅛n
No. 3 amber blanket crepe, Oct.	26⅛n	26⅛n

FUTURES — REX CONTRACT

	Oct. 9	Prev. Close
Nov. ..	29.25b–29.45a	29.30b–29.45a
Jan. ..	28.70b–29.00a	28.80b–29.00a
March ..	28.65b–28.85a	28.70b–28.75a
May ..	28.45b–28.65a	28.50b–28.70a
July ..	28.40b–28.60a	28.40b–28.65a
Sept. ..	28.35b–28.55a	28.35b–28.60a
Nov. ..	28.30b–28.55a	28.30b–28.55a

Sales: Nil. Tendency: Quiet.

Futures were steady in quiet featureless dealings on October 9. Physical rubber was quiet and steady. Factory interest was negligible.

SINGAPORE

Overseas advices were somewhat better than expected on October 9 and opening levels were slightly higher, but buying interest was not maintained and prices declined in thin trading. There was little interest either way. Lower sheet interest was small and selective. Nos. 2 and 3 RSS were traded at slightly wider discounts. In the afternoon the market ruled very dull. Prices remained virtually unchanged. Lower sheet continued in slight demand and sellers were rather more inclined to meet the market.

	Malayan cents per lb., fob Malayan ports to open ports	
	Oct. 9	Prev. Close
No. 1 RSS, Oct. ..	84⅛–84⅜	84⅜–85
Nov. ..	84⅜–84½	84⅜–85
No. 2 RSS, Oct. ..	82½–83½	83½–84
No. 3 RSS, Oct. ..	80½–81	81⅛–81⅜
No. 4 RSS, Oct. ..	79½–80½	80 –80½
No. 5 RSS, Oct. ..	77 –78	77½–78
No. 1 RSS, Spot ..	84 –84⅜	84⅜–85
No. 3 blanket thick remilled crepe, Oct.	74 –74½	75½–76½
No. 1 fine pale crepe, October	92½–93½	93½–94½
2x thin brown crepe, October	72– 73	72½–73½

Tendency: Quiet.

The Industries Syndicate quote latex, native produce, 60% centrifugal, packed in rectangular drums, fob, at 166.60d. per gallon.

AMSTERDAM

The Amsterdam rubber market ruled as under on October 9:

	Guilders per kilo	
No. 1 RMA	Oct. 9	Previous
October	2.34	2.36
November	2.34	2.36
December	2.34	2.36
October/December ..	2.34	2.36
January	2.34	2.36
February	2.34	2.36

Sales: Nil. Tendency: Easy.

DJAKARTA

	Rupiahs per kilo	
	Oct. 9	Previous
Spot No. 1 Priok ..	35.00b	35.00b
Spot No. 2 Priok ..	34.00b	34.00b
Spot No. 3 Priok ..	33.00b	33.00b
No. 1 fine pale crepe, spot	33.00b	33.00b

Tendency: Steady quiet.

CEYLON

The price of No. 1 RSS at Colombo on October 9 was 101⅞ (102⅛) Ceylon cents per lb.

BANGKOK

The price of No. 1 RSS at Bangkok on October 9 was 27.25 (27.25) US cents per lb.

STOCK MARKET

Continued from page 585

of £200,000 as a result of the cut. But apart from these individual factors, it has been made clear by the Chancellor of the Exchequer that the credit squeeze is to stay. And for this reason alone I feel that the outlook for the rest of the year remains one of continued uncertainty. The only thing for my money which will clear the fog will be if we succeed at long last to solve the problem of exporting more abroad.

Expansion is the keynote to the announcement from P. B. Cow that negotiations are in process of being completed for the take-over of BRITISH ARTID PLASTICS. Subject to contract, the price is proposed to be satisfied as to £25,000 cash and a block of shares at an agreed price of 9s. 4½d. It was stated that this acquisition will give the plastics side of the Cow group facilities for necessary expansion.

Disappointing news from the boardroom of ASSOCIATED CHEMICALS which returned profits for the first half of the year down £166,000 to £382,000. The chairman, Mr Michael Hutton-Wilson, said 'the trend towards narrower margins in both home and export fields continues. Increasing competition has resulted in reduced selling prices and increased costs have had to be absorbed'. But for this time anyway, the dividend is to be held at 6¼%.

GEORGE ANGUS are holding interim at 7½%. Progress report said that the group's total turnover in the first eight months of the year shows an increase over the same period a year ago.

PLASTICS MACHINERY DEVELOPMENTS

Continued from page 581

therefore, is the visual water control which is standard equipment on each machine. The only attachments necessary are the feed and drain.

Conclusions

The merits of the automolder machines can barely be described in standard terms. The ruggedness of the machine cannot be over-emphasized since this 'Rolls-Royce' treatment will ensure long trouble-free moulding.

All modern features are included with provision for the use of hot runner moulds, a subject of growing concern for injection moulding engineers. Visual water control and volumetric feed control ensure attention to those finer points of moulding which, when left to their own devices, are often the cause of trouble.

Another important feature is the compactness of the machines. This ensures the use of minimum floor space and ready accessibility of all controls.

Industry INTELLIGENCE

Technical Data

Diolpate Polymeric Plasticizers

The Diolpates are linear polyesters derived from adipic acid. Used with pvc their high molecular weight gives lower volatility, greater resistance to solvent extraction and a lower rate of migration compared with monomeric plasticizers. Plasticizing efficiency and ease of compounding are somewhat poorer but these disadvantages are minimized by various methods of chain stopping which result in lower viscosity plasticizers for a given degree of permanence.

Diolpates 160, 195, 214 and THL are described in technical data sheets available from the manufacturers Briggs and Townsend Ltd., Commercial Street, Manchester 15.

Carbon Black Pigment

Carbon black YBVS paste, just introduced by the Dyestuffs Division of I.C.I., is an aqueous dispersion of carbon black specially designed for the mass-pigmentation of viscose by the master batch method.

It is equal in shade and strength in viscose to the earlier carbon black BVS paste, which is primarily intended for the direct injection process for viscose coloration. Users will now therefore be able to choose the carbon black V paste appropriate to their requirements and the method of application employed and so ensure maximum spinning efficiency with freedom from pigment flocculation and filter blockage troubles.

Carbon black YBVS paste contains a blue-shade carbon black and it will therefore be of special interest to those users who normally add a blue shading component such as indigo or phthalocyanine blue to the carbon black to give a blue tone to the shade.

Carbon black YBVS paste is also suitable for pigmenting polyvinyl acetate emulsion paints and in paper coating applications.

Butyl Modifier

Pronar is a new promoter for the heat treatment of butyl rubber, marketed by the Anchor Chemical Co. Ltd., Manchester 11, and described in Anchor Bulletin 159/R/61, available from the company.

Heat treatment of reinforced butyl rubbers results in substantial increases in resilience, modulus, abrasion resistance and electrical resistance. This involves milling the compound for long periods at abnormally high temperatures and to be practical in production a promoter is needed to ensure completion of heat treatment during normal milling cycles.

Pronar is economic in use and is non-discoloring, allowing the advantages of heat treatment to be extended to light-coloured rubbers. The active ingredient is a chlorinated compound in an inert diluent to facilitate handling and dispersion. The bulletin gives preliminary information on the use of Pronar in black and light-coloured butyl rubbers.

Machines, Materials and Equipment

Bulk Plasticizer Storage

A. Boake, Roberts and Co. Ltd., Carpenters Road, Stratford, London, E.15, has issued some notes on the bulk storage and delivery of Abrac plasticizers.

The first section of these notes consists of general observation on the bulk storage of plasticizers, based on the company's own experience. Details are given on the construction of storage tanks and the provision of moisture traps, filters, meters and gauges.

The second section deals with the methods of discharge and coupling used on Abrac road tankers. Further and more detailed information on specific problems can be obtained from the company.

Optical Digitizer and Decoder

Lindars Automation Ltd., 143 Maple Road, Surbiton, Surrey, has produced an optical digitizer and decoder by means of which visual readings on a variety of instruments can be translated into digital form for the purpose of operating controls or producing records. Typical applications are the production of punched tape or cards and weight print-out by a weighing machine having a dial scale.

This equipment has applications in a number of industries from the machine and fitting shops to process control installations in the chemical and food industries where information on flow pressure, temperature and weight is required to control the process of feed information to recorders or computors.

New Dexion Shelves

Dexion Ltd., manufacturer of the Dexion system of slotted angles, has announced a new range of steel shelves.

The new range of shelves, in sizes 36in. wide by 12in., 18in., 24in., 30in. and 36in., will be available in different strengths. There will be 11 shelves in all. The 12in. and 18in. widths will be supplied in light and standard gauges, the 30in. and 36in. in standard and heavy, and the 24in. shelf will be available in all three strengths. The light duty shelf is claimed to be suitable for loads up to 150lb., standard shelves for loads up to 450lb., and heavy duty shelves for loading capacity up to 900lb.

Further information can be obtained from the company at Maygrove Road, London, N.W.6 (UK Division).

Publications

Cellobond Polyester

The increasing industrial use of polyester/glass as a material of construction is well illustrated in a new booklet entitled 'The Cellobond Polyester Story' published by British Resin Products Ltd, Devonshire House, Piccadilly, London, W.1.

The booklet opens with an introductory section on the manufacture, properties and use of Cellobond polyester resins. It then goes on to show how the needs of nine major industries are being met by the special properties of polyester / glass - high strength/weight ratio, and resistance to chemicals and weathering without the protection of paint.

It sets out to explain, by text and illustrations, the reason why the uses of polyester/glass in each industry are expanding.

Elastomers Notebook No. 20

Du Pont (UK) Ltd., 76 Jermyn Street, London, W.1, has issued Elastomers Notebook No. 20. This issue contains an article on all-weather jacketing protecting emergency power cables. The example given is an auxiliary power plant for Okinawa. This is a US Army barge which transmits power ashore via 480ft. of cable covered with Du Pont neoprene.

Another article gives the results of a test made on neoprene. It is claimed, after a 20-year experiment at an outdoor exposure station, that it is now serviceable for over 50 years.

The Xenon Lamp

The Dyestuffs Division of Imperial Chemical Industries has issued a booklet on the Xenon Lamp, reprinted from *Transactions of the Institution of the Rubber Industry*.

In the booklet, methods of evaluating the tendency of a white rubber compound to discolour on exposure to light are considered and differences between exposure in the open and under glass or Perspex, with the variations occurring when the exposure is repeated at some later date, are discussed. A comparison of the discoloration obtained out of doors, is made with that obtained when exposure to a xenon, mercury and carbon arc source is carried out. A general indication of the value of the xenon source for this purpose and also for the fading of pigments incorporated in pvc is given.

Material Prices

Prices of materials appear regularly in RUBBER AND PLASTICS WEEKLY each month. It will be appreciated if suppliers will give notification of any price changes and additions to or deletions from their range. Comments on the present materials and classifications are invited in order that the list may be made of maximum service to our readers.

Unless otherwise stated prices are per lb. In most cases prices vary according to quantity. pc—per cwt pg—per gallon pt—per ton ag—according to grade xs—ex-store xw—ex-wharf dp—duty paid sp—special prices for contracts del—delivered cp—carriage paid

Accelerators

Alpha ..... 5s. 8d.—6s. 4d.
Ancap cp ..... 2s. 10d.—3s. 8d.
Ancap Zinc Salt cp ..... 3s. 2d.—4s. 2d.
Ancatax cp ..... 3s. 9d.—4s. 6d.
Ancazate BU cp ..... 6s. 3d.—6s. 9d.
Ancazate ET cp ..... 5s.—6s. 4d.
Ancazate ME cp ..... 6s. 2d.—7s.
Ancazate Q cp ..... 6s. 1d.—6s. 4d.
Ancazate XX cp ..... 5s. 1d.—5s. 9d.
Ancazide ET cp ..... 5s. 9d.—6s. 6d.
Ancazide IS cp ..... 7s. 6d.—8s. 6d.
Ancazide ME cp ..... 4s. 6d.—5s.
Cu.D.D. ..... 9s. 3d.—10s.
D.Bu.D ..... 10s. 6s.—11s. 3d.
D.D.D. ..... 12s. 2d.—13s. 3d.
D.P.G. cp ..... 3s. 5d.—4s. 2d.
D.O.T.G. cp ..... 4s. 5½d.—4s. 9d.
Dibenzo GMF ..... 27s.—28s. 6d.
Furbac cp ..... 5s.—5s. 9d.
Gamma ..... 10s. 6d.—11s. 3d.
GMF ..... 27s.—28s. 6d.
L.M.D. ..... 9s. 3d.—10s.
M.Z.I. ..... 3s. 6d.—4s. 2d.
N.Bu.D ..... 10s. 6d.—11s. 3d.
Ni.P.D. ..... 12s. 2d.—13s. 3d.
P.P.D. ..... 12s. 2d.—13s. 3d.
P.T.D. ..... 12s. 2d.—13s. 3d.
Robac 22 ..... 10s.—11s. 3d.
Robac 44 ..... 9s. 1d.—9s. 10d.
S.P.D. ..... 9s. 3d.—10s.
Suparac M ..... 9s. 7d.
T.B.U.T. ..... 15s.—16s.
T.E.T. ..... 6s. 6d.—7s. 4d.
Thiuram P.25 ..... 15s.—16s.
T.M.S. ..... 7s. 8d.—8s. 6d.
T.M.T. ..... 5s. 4d.—6s. 3d.
Vulcacit CZ deldp ..... 7s. 1d.
Vulcacit F deldp ..... 4s. 8½d.
Vulcacit NP deldp ..... 11s. 2d.
Vulcacit P Extra N deldp ..... 8s. 1d.
Z.B.E.D ..... 15s.—16s.
Z.Bu.D ..... 6s. 3d.—7s. 3d.
Z.D.C. ..... 5s. 1d.—5s. 7d.
Z.L. ..... 9s. 3d.—10s.
Z.P.D ..... 9s. 3d.—10s.

Antioxidants and Antiozonants

Agerite AK cp ..... 3s. 6½d.—4s. 5½d.
Agerite HPX cp ..... 4s. 5d.—4s. 10d.
Agerite Powder cp ..... 3s. 7d.—4s.
Agerite White cp ..... 8s. 10d.—9s. 7d.
Antioxidant 2246 cp.. 11s. 8d.—12s. 4d.
Antioxidant 425 cp.... 18s. 6d.—19s. 3d.
Antioxidant SP cp ..... 3s. 8d.—6s.
BLE-25 ..... 3s. 7d.—4s. 5d.
BXA ..... 3s. 6½d.—4s. 5½d.
Naugawhite ..... 4s. 9d.—5s. 6d.
Octamine ..... 3s. 9d.—4s. 6d.
Polygard ..... 3s. 7½d.—4s. 5d.
UOP 88 xs ..... 9s. 3d.
UOP 288 xs ..... 9s. 3d.
Wing-Stay S ..... 3s. 8d.—4s.
Wing-Stay T ..... 4s. 10d.—5s. 6d.
Wing-Stay 100 ..... 10s. 6d.—11s. 6d.

Compounding Ingredients

Barytes ptag ..... £10—£40
Calcium Silicate del ..... 9d.—10½d.
Calcene ptxw ..... £52—£69 10s.
Calcined Clay (Burgess) ptxs .. £37—£53
Carbonate, Light Mg. ptsp £97
Carbonate, Actidated Ca. pt .... £28—£30
Carbon Blacks:
Conductex SCF ..... 1s. 2½d.
Continental AMPC ag 11½d.—1s. 4½d.
Continex FEF ag ..... 9½d.—10½d.
Continex HAF ag ..... 10½d.—11d.
Continex HMF ag ..... 9½d.—9½d.
Continex ISAF ag.. 1s. 0½d.—1s. 0½d.
Continex SRF, SRF-NS ag 8½d.—9d.
Dixie 45 GPF xs ..... 6½d.—7½d.
Dixie 60 HAF xs ..... 7½d.—8½d.
Dixie 70 ISAF xs ..... 9½d.—10½d.
Dixiedensed HM MPC xs ..... 11½d.
Dixiedensed 77 EPC xs ..... 11½d.
Furnex SRF ..... 9d.
Kosmos 45 GPF ..... 6½d.—7½d.
Kosmos 60 HAF ..... 7½d.—8½d.
Kosmos 70 ISAF ..... 9½d.—10½d.
Magecol 888 cp ..... 7.60d.
Micronex MPC ..... 11½d.
Micronex W6 EPC ..... 11½d.
Philblack A. FEF ..... 7d.—8d.
Philblack E. SAF.... 1s. 0½d.—1s. 1d.
Philblack G. GPF ..... 6½d.—7½d.
Philblack I. ISAF ..... 9½d.—10½d.
Philblack O HAF ..... 7½d.—8½d.
Statex B. FF ..... 10½d.
Statex R. HAF ..... 11d.
Statex 93 HMF ..... 9½d.
Sterling SO FEF ..... 7d.—7½d.
Sterling V. GPF ..... 6½d.—7d.
Ukarb 327 GPF xs ..... 6½d.—7½d.
Ukarb 340 xs ..... 7½d.—8½d.
Vulcan 6 ISAF ..... 9½d.—10d.
Vulcan C CF ..... 11d.—11½d.
Vulcan 3 HAF ..... 7½d.—8d.
Vulcan XXX SCF.. 1s. 2½d.—1s. 2½d.
China Clay ptagxs ..... £12—£68 10s.
Factice Dark cp ..... 1s. 0½d.—1s. 10d.
Factice Whitbro cp .. 1s. 3½d.—2s. 2½d.
Factice White ..... 1s. 5½d.—1s. 11d.
Kieselguhr Spanish White ptxs £37 12s. 6d.
Lithopone 30% ptxs ..... £68 10s.
Manosil VN3 pt ..... £109—£139
Manosil AS7 ..... £84 10s.—£114 10s.
Micafine Powdered Mica ptxs.. £67 10s.
Ochre Yellow pcxs ..... £1 19s.
Oxide Light Mg ptsp £245
Oxide Red pcxs ..... £4 3s.
Oxide Titanium 98% pcxs £8 8s
Rutiox CR pcxs £9 3s
Rubber Gen. Gran. Mineral ptxs £35 5s.
Shellac Dewaxed xs ..... 2s.—3s. 9d.
Shellac Orange xs ..... 1s. 9d.—2s. 3d.
Silica Hydrated ptxs £113
Sulphur Manox Insoluble del .... 1s. 9d.
Sulphur Powdered ptdel ..... £20 17s.
Sulphur Sublimed Flowers ptxs £52 10s.
Talc Norwegian ptxs ..... £13 7s. 6d.
Talc Italian ptxs ..... £30 2s. 6d.
Tufknit Durham CS ..... 8½d.—10½d.
White Lead Dry ptdelsp ..... £114 15s.
Whitetex 2 Clay ptxs ..... £45 10s.
Whiting ptxs ..... £5 9s. 6d.—£7 7s. 6d.
Zinc Oxide pcdel £6

Plasticizers and Softeners

Abalyn pc ..... 220s.—271s.
Al Stearate ptxwdp ..... £253 10s.
Bisoflex 102 pt ..... £513—£568
Butyl Ricinoleate ..... 2s. 6d.—2s. 6½d.
But. Ac Ricinoleate.. 3s. 0½d.—3s. 1½d.
Butyl Stearate pt ..... £277—£282
Ca. Stearate ptcp £220
Diallyl Phthalate.... 3s. 11d.—4s. 11½d.
Dialkyl Phthalate pt ..... £221—£222
Dibutyl Phthalate pt ..... £203—£204
Dibutyl Sebacate ..... 5s. 9½d.
DiOA pt ..... £354—£357
DiOS sp ..... 5s. 0½d.—5s. 2d.
DOA pt ..... £414—£420
DOP pt ..... £276—£277
DOS sp ..... 5s. 7½d.—5s. 9d.
Diisobutyl Phthalate pt ..... £196—£197
Diisooctyl Phthalate pt.... £221—£222
Dinonyl Phthalate pt ..... £211—£212
DNS sp ..... 5s. 2½d.—5s. 4½d.
Ester Gum pcag ..... 130s.—150s.
Flexol 3GO ..... 4s. 8d.
Hercolyn pc ..... 242s.—294s.
Lankroflex ED3 ..... 3s. 2d.—3s. 2½d.
Lankroflex 29 pt ..... £216—£217
Lead Stearate ptxwdp ..... £223 10s.
Methyl Ricinoleate.... 2s. 4d.—2s. 4½d.
Me. Ac Ricinoleate.. 2s. 11½d.—3s. 0½d.
Polyglycol Oleate 400 pt £285
Reomol D79A pt ..... £354—£357
Reomol D79S sp .... 5s. 0½d.—5s. 2d.
Reoplex 100 sp ..... 6s. 1½d.—6s. 2½d.
Reoplex 110 sp ..... 5s. 10d.—6s. 5½d.
Reoplex 220 sp ..... 5s. 6½d.—5s. 8d.
Reoplex 300 sp ..... 7s. 2d.—7s. 3½d.
Reoplex 400 sp ..... 4s. 2½d.—4s. 4d.
Rosin Oil pgag ..... 8s.—18s.
Triphenyl Phosphate pt £359
Tricresyl Phosphate pt £233
Trixylyl Phosphate pt £200
Zinc Stearate ptdel ..... £220—£230

Solvents and General Chemicals

Acetic acid ptdel ..... £77—£100
Acetic Anhydride ptdel £128
Acetone ptdel ..... £75—£120
Alcohol:
Absolute 74.5 op pgdel 4s. 0½d.—4s. 4½d.
Butyl pt ..... £132—£193 10s.
sec-Butyl ptdel ..... £128—£168
Ter-Butyl ptdel ..... £172—£195
Isopropyl Tech. 99% pgdel 5s.—6s. 5½d.
Butyl 'Carbitol' pt £283
Butyl Acetate pt ..... £159—£217
Caprylic Acid ptdel £395
Carbon Bisulphide ptxs ..... £71 10s.
Carbon Tetrachloride pg.. 12s. 4d.—20s.
'Cellosolve' Acetate pt £250
Cresol m- 98% del ..... 4s. 9d.
Cresol o- 30/31°C. del ..... 1s.
Cresol p- 34/35°C. del ..... 5s.
Ethyl Acetate pt ..... £131—£189
Formaldehyde ptdel £40
Glycol:
Diethylene pt £158
Ethylene pt £132
Polyethylene 200 pt £214
" 300 pt £214
" 400 pt £214
" 1,500 pt £264
" 4,000 pt £274
" 6,000 pt £294
Isopropyl Acetate pt ..... £126—£184
Isobutyl Acetate 80% pt.. £126—£185
Lauric Acid ptdel £273
M.E.K. ptdel.... £134 10s.—£143 10s.
M.I.B.K. ptdel ..... £166—£209
Methylated Spirits pgdel:
Industrial 61op.... 5s. 5½d.—7s. 2d.
" 74 op.... 6s. 3d.—7s. 11½d.
'Q' grade 68 op.. 8s. 5½d.—10s. 5d.
Pyridinised 66 op.. 5s. 10d.—7s. 6½d.
Denatured Methanol 3s. 9½d.—4s. 10d.
Monoethanolamine pt £252
Naphtha Coal tar pg:
Heavy 90—190 ..... 4s.
Light 90—160 ..... 5s. 1d.
Palmitic Acid ptdel £147
Phenol pldel ..... 1s. 4d.—1s. 7d.
Pyridine pg ..... 16s. 6d.
Stearine ptag ..... £108—£130
Toluol Pure/Nitration pg ..... 5s. 8d.
Toluol 90's pg ..... 5s.
Triethanolamine pt £224
Xylol 2/30 pg ..... 5s. 9d.

Polymer Degradation Symposium

THE Institution of the Rubber Industry (Manchester Section) and the Plastics Institute (North-Western Section), in collaboration with Moston College of Further Education (formerly Newton Heath Technical College) are holding a joint symposium on 'The Degradation of High Polymers'. This will be on Friday December 8 1961, at the college (Ashley Lane, Manchester 9), beginning at 10 a.m.

The symposium programme is given below, with summaries of the papers.

Structure and Stability in Polymers, by Dr N. Grassie (Glasgow University).

The polymer chain represents a very special type of molecular environment in which chemical reactions may occur. These polymer degradation reactions are usually basically similar to well-known classical organic processes but their unusual environment often impresses upon them quite novel features. On the basis of this unifying theme, the stability of polymers will be discussed.

Some Practical Problems Associated with Degradation, by Dr R. R. Smith (BX Plastics Ltd.).

A selection of cases will be discussed in which degradation of high polymers is of practical importance. General consequences will be sketched for a number of polymers, including pvc, polyacetal, polymethyl methacrylate.

Performance Problems of Rubbers and Plastics in the Motor Industry, by A. E. Bray (Morris Motors Ltd.).

Some of the problems that will be considered are:

1. The climatic conditions, particularly with reference to temperature and humidity in which motor vehicles have to operate in different parts of the world.

2. Ozone attack on rubbers and the work being done to obtain a satisfactory accelerated test.

3. Staining of plastics, paint, etc., by antioxidants and antiozonants.

4. Effects of UV light particularly with regard to transparent pvc and the use of UV stabilizers.

Aims and Objects

The British Plastics Federation's recent publication, 'Aims and Objects', has met with a good response. Nearly 200 firms and associations, at home and abroad, in addition to Federation members, have applied for copies. Copies can be obtained from the Federation at 47/48 Piccadilly, W.1.

British Standards

Flexible Urethane Foam for Vehicles (BS 3379:1961)

This British Standard is entitled 'Flexible load bearing urethane foam components "polyether type" for vehicles' It covers the polyether foam cushioning used for seating, arm rests and back rests in aircraft, trains and road vehicles. A similar standard is being prepared for the furniture industry, whose needs are felt to differ to some extent from those of the transport industry.

The standard mentions three classes of material subdivided into nine hardness grades and lays down requirements for construction, surface condition, odour, colour and tolerances on dimensions. Detailed methods of test and limits are provided for physical and chemical requirements, with the object of ensuring that these materials retain their cushioning qualities for a reasonable period of time and do not stain other materials with which they come into contact.

Copies of the standard may be obtained from the British Standards Institution, Sales Branch, 2 Park Street, London, W.1, and from the Manchester Branch, Coronation House, Market Street, Manchester 1, price 6s. each.

Calls for Tenders

Transparent Plastics Sheets

One hundred transparent plastics sheets, plain, clear and 60in. x 48in. x ⅛in., together with 20 more of the same size but green, are required by the Director-General, Union of Burma Purchase Board, St John's Road, Rangoon, to whom bids should be sent, quoting Quotation No. III B/642/60-61(H). Closing date: October 16 1961. (Ref. ESB/30711/61.)

Tyres and Tubes

Tyres and tubes of several sizes are required by the Director-General, Union of Burma Purchase Board, St. John's Road, Rangoon, to whom bids should be sent, quoting Quotation No. IIIA/611/P. and M. (60-61). Closing date: October 25 1961.

Future Events

Plastics Institute

Midlands Section — October 20 at the James Watt Memorial Institute, Great Charles' Street, Birmingham 3, at 6.30 p.m. 'Terylene: the fibre for fashion and industry,' by R. Gladstone (Imperial Chemical Industries Ltd.).

North-Western Section — October 20. Visit to Standard Triumph Ltd., Coventry.

Western Section — October 18, at Dowty Group Ltd. Lecture Room, Arle Court, Cheltenham, at 7 p.m.: 'Rotational castings of pvc platisols,' by T. H. Carr (Lintafoam Ltd.).

COUNTY COURT JUDGMENTS

NOTE.—These judgments which are supplied from the Registry of County Court Judgments, Lord Chancellor's Department, 3 Dean's Yard, London, S.W.1, are not necessarily for debt, and some may have since been satisfied. They may be for damages or otherwise, they may relate to actions bona fide contested between the parties, or they may be against defendants liable in a representative capacity and not personally; but no distinction is made on the register. A judgment does not imply inability to pay. Judgments are not returned to the Registry if satisfied in Court Books within twenty-one days.

W. J. T. Osbourne, Maldon Road, Tiptree, Essex, tyre repairs and manufacturers. Derby, £10, August 11 1961.

G. E. Bramley (T/A Stratford Tyre Service), 127 The Grove, Stratford, London, E.15, tyre dealer. Bloomsbury, £68, July 27 1961.

Lightweight Plastics Ltd., Slade Lodge, Ilfracombe, Devon. Barnstaple, £126, August 4 1961.

Star Plastics Ltd., Ling House, Dominion Street, Moorgate, London, E.C.2. Shoreditch, £24, July 24 1961.

New Colimbia Rubber Co. Ltd., 34 Upper Brook Street, London, W.1. London, Mayor's and City, £290, July 14 1961.

Stratford Tyre Service, 127 The Grove, Stratford, London, E.15. Stourbridge, £18, July 25 1961.

Wembley Tyre Service, 33 Blackbird Hill, N.W.9. London, Marylebone, £22, June 26 1961.

B. T. Jenkins, 25 Sydenham Road, Cotham, Bristol, 6, tyre dealer. Bristol, £23, July 25 1961.

Star Plastic Products Ltd., 89 Stoke Newington Church Street, N.16, Middlesex, moulding and fabricating plastics. Chelmsford, £129, July 24 1961.

Changes of Name

Homeward Products Ltd. (630,677), manufacturers of, and dealers in, engineering and plastics products, etc., Adam House, 1 Fitzroy Square, W.1. Name changed to Drake Electrical Industries Ltd. on January 9 1961.

Rowlands (Homerton) Sales Ltd. (677,550), manufacturers and dealers in leather, canvas, plastics and rubber goods, 3/5 Furrow Lane, E.9. Name changed to Rowlands (Homerton) Ltd. on January 2 1961.

Autoprufe (Sales) Ltd. (597,572), 265 Stoney Stanton Road, Coventry. Name changed to Bodmin Plastics Ltd. on February 1 1961.

Blundell's Tyre Service Ltd. (466,365), 34/35 Wincheap, Canterbury. Name changed to Groom's Tyre Service Ltd. on January 30 1961.

Latest Wills

Christopher Gordon Richford, of Roslyn, The Drive, Northwood, Middx., of E. M. Richford Ltd., rubber stamp and stamp pad manufacturers, who died on November 19 last, left £12,283 net value.

This one-piece glass reinforced polyester moulding is fitted to the 1961 Hotpoint home dryer. Using Owens-Corning Fiberglas material, the moulding saved Hotpoint around $60,000 in tooling costs

CLASSIFIED ADVERTISEMENTS

RUBBER AND PLASTICS WEEKLY

APPOINTMENTS VACANT

8d. a word, Minimum 12/- Box 2/-

ASSISTANT plant engineer required by rubber manufacturers situated in Hertfordshire. Previous experience desirable of maintenance of machinery for the production of mandrel made braided hose, mouldings and mechanicals, and applicant must have previous general engineering experience in a rubber manufacturer's plant. Essential to have qualifications of AMIMechE level. For the successful candidate this post carries good prospects for very quick promotion, with ultimate responsibility for plant installation and maintenance, equipment design, development and all engineering staff. Applicant who is married and aged between 25 to 35 years will be preferably considered. Accommodation available after promotion. Contributory pension scheme, canteen facilities and bonus scheme.—Apply giving full details of age, education and experience to Electric Hose and Rubber Co. Ltd., Harpenden, Herts. (073)

ASSISTANT Chief Chemist.—A qualified Chemist/Rubber Technologist required with knowledge of the compounding of synthetic rubbers; experience of plastics technology an advantage. The Company manufactures flexible aircraft fuel tanks, specialized rubber mouldings and a range of commercial containers. — Please write, giving details of age, education, experience, salary, etc., to Personnel Manager, Fireproof Tanks Limited, The Airport, Portsmouth. (064)

CHARGE hand required for surgical plastic department. Knowledge of extrusions advantageous.—Write stating age, experience and salary required to Box 054. (054)

CHARGE hand for rapidly growing company. Must have good knowledge of moulding and willing to work. Good wages and prospects for right man.—Fleet Rubber Products Ltd., 89 Sheerness Harbour Estate, Sheerness, Kent. Tel. Sheerness 2331. (080)

EAL EXECUTIVE APPOINTMENTS LIMITED
78 Wigmore Street, London, W.1

PRODUCTION MANAGER **Rubber hose**

A long established and well-known company engaged in manufacture of a wide range of rubber and plastics goods seeks a Production Manager to be responsible for manufacture of rubber hose products. Candidates will be men aged 35-40, with engineering background, specialist knowledge of processing rubber products, relevant professional qualifications and managerial experience in hose production. Salary in region of £2,000 p.a.

This post, in a large and progressive organisation, offers considerable scope to a thoroughly sound 'hose' man who can draw on practical experience to build team effort and inspire a sense of urgency (RN.115C).

Please write briefly in strictest confidence to the Managing Director, quoting the reference number. No identities divulged without permission. (074)

APPOINTMENTS VACANT

(continued)

FOREMAN required, fully experienced in the compounding of synthetic rubbers and should have first class knowledge of all aspects of calendering. This will be a permanent, progressive position in a rapidly expanding department and the selected applicant will be responsible to the existing Departmental Superintendent. Applicants should have held a similar supervisory position and had a number of years' experience in the above processes. — Please write, giving details of age, experience, salary, etc., Box 065. (065)

LABORATORY assistant required, aged 20/23 years. Qualifications: LIRI or Ordinary National Certificate, chemistry. Experience of dry rubber compounding and processing preferred.—Applications in writing to The Technical Manager, Guide Bridge Rubber Co. Ltd., Vulcan Mill, Butcher Lane, Bury, Lancs. (032)

PRECISION Rubbers Limited have a vacancy for a qualified and experienced chemist/technologist, aged 25-35, to undertake compounding and other development work in connection with synthetic rubbers. This appointment offers considerable scope and interest for a man with initiative and ability.—Apply in writing, giving particulars of age, training, qualifications and salary required to The Technical Director, Precision Rubbers Limited, Bagworth, Leicester. (052)

RUBBER technologist required by old-established rubber hose manufacturers in Hertfordshire for process control and laboratory development. Suitable for young man of 20/25 years, but must be semi-qualified to LIRI standard. Time will be allowed for study to AIRI level in London. Excellent prospects are offered to a man showing keenness, energy and with ability to shoulder responsibility. Contributory pension scheme, canteen facilities, good salary and bonus scheme.—Apply giving full details of age, education, training and experience to Electric Hose and Rubber Co. Ltd., Harpenden, Herts. (072)

SENIOR process control technician wanted by George MacLellan and Co., Ltd. Applicants should have qualifications of HNC standard or better; with at least three years' experience of process control in the rubber industry. Preferred age is in the range 25-35. The man appointed will find the work interesting and varied; and will have good prospects of advancement in an expanding technical organisation.—Applications giving particulars of education, experience and starting salary required to Personnel Manager, George MacLellan and Co., Ltd., 125 Shuna Street, Maryhill. (075)

A young qualified

RUBBER COMPOUNDER

is required by

The North British Rubber Co. Ltd.

for the

Dumfries Factory

The position offers good succession prospects for a man (25-30 years of age) with general Mechanical Products experience. Preference will be given to applicants having belting or footwear background. Removal expenses will be paid.—Applications, which will be treated in confidence, to Industrial Relations Manager, Heathhall, Dumfries. (077)

EXPORT ISSUE

OCTOBER 21 1961

A REMINDER

Advertisers who may wish to place a **small announcement concerning their organisation** in the **Classified Section** of our **EXPORT ISSUE**, are reminded that copy must be received by

11 a.m., TUESDAY OCTOBER 17

APPOINTMENTS VACANT

(continued)

SPONGE production. A chemist with good experience of sponge and a technician similarly qualified are urgently required by growing company in country district. Excellent working conditions and pension arrangements.—Write with full details of career and salary required to Box 463. (463)

TECHNICAL assistant required in cable works laboratory.—Applicants of LIRI standard or with 'A' level chemistry or physics should apply to The Chief Chemist, Hackbridge Cable Co. Ltd., Kelvin Works, Hackbridge, Surrey. (070)

YOUNG man required for development work in laboratory of small progressive brake lining company, location South-West England. Qualification ONC or HNC chemistry.—Box 081. (081)

NEOPRENE mouldings. User of precision mouldings unable to find satisfactory supplier has set up own moulding shop. Vacancy for young experienced foreman to join expanding business.—Write with details of experience, age, salary required to Hellermann Ltd., Crawley, Sussex, for the attention of H. R. Whyte. (082)

APPOINTMENTS WANTED

8d. a word, Minimum 12/- Box 2/-

EXECUTIVE, works trained, administrative and sales overseas since war, seeks change. Age 45, able and energetic. Accustomed negotiating board level. Fluent French, some German.—Box 085. (085)

GRADUATE with technical education prospects, seeks year or so rubber plastics works and laboratory. Some experience both. London area.—Box 076. (076)

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MACHINERY FOR SALE

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'COTSWOLD' dipping machines and circulating tanks for latex and PVC. New catalogues now available on request. Lionel Hook and Sons, Ebley, Stroud, Glos. Tel.: Stonehouse 614/5. (380R)

FOR sale, in splendid condition. 1 horizontal vulcanising pan, 13ft. 9in. x 7ft. 6in. diameter. Quick-lock door, 60 w.p., complete with cariage, loading pans and base stand. Price ex works for quick sale—£500.—Box 066. (066)

JACKETED Z-bladed duplex mixer by Baker Perkins, fully jacketed, including lid. Pan 4ft. 5in. x 3ft. 8in. x 3ft. deep. Geared both ends, complete with hydraulic tipping gear. Duplex chain drive, fitted 50 h.p. flame-proof slip ring motor and starter. Recently reconditioned and bearings renewed. £1,500. —Box 078. (078)

MANUFACTURERS of roughing machines for rubber sheeting, sponge rubber, splitting machines, leather cloth plant, embossing plates and rollers, spreading machines and presses.—G. L. Murphy Ltd., Imperial Works, Menston, Nr. Leeds. (238R)

Donald Leaver Limited

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FOR **SECONDHAND PLANT AND MACHINERY** (1057)

MACHINERY FOR SALE

(continued)

SHAW 60in. x 22in. mill with 100 h.p. drive. 30in. x 24in. and 21in. single geared cracker with 200 h.p. drive. Pair of 50in. x 18in. single geared mills with 140 h.p. drive. Several smaller mills.—Reed Brothers (Engineering) Ltd. (Mr. C. E. M. Hardie—Receiver and Manager), Replant Works, Woolwich Industrial Estate, London, S.E.18. Tel.: Woolwich 7611 (068)

UNUSED 60in. x 22in. single geared mixing mill, friction ratio 1.15 to 1, Vibro mounted, Lunn safety equipment, driven by 125 h.p. slip ring motor.—Box 069. (069)

MACHINERY WANTED

8d. a word, Minimum 12/- Box 2/-

LABORATORY mill, about 12in. rolls.—Box 053. (053)

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8d. a word, Minimum 12/- Box 2/-

4½ TONS of para rubber. Manchester user no longer requires. What offers?—Box 084. (084)

AGENCIES and REPRESENTATIVES

8d. a word, Minimum 12/- Box 2/-

SALES representative, Manchester based, experienced in selling raw materials to the plastics and rubber industry. Four-figure salary envisaged, plus car, expenses and pension scheme. —Send full details to the Secretary, C. Tennant, Sons and Co. Ltd., Harp Lane, London, E.C.3. (083)

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The Trade Mark set out below was assigned on the 29th March, 1961, by Blundell-Permoglaze Limited (formerly Blundell, Spence & Company Limited) of Bankside Works, Sculcoates Lane, Hull, Yorkshire to Blundell Spence & Company Limited of York House, 37, Queen's Square, London, W.C.1 WITHOUT THE GOODWILL OF THE BUSINESS IN WHICH IT WAS THEN IN USE

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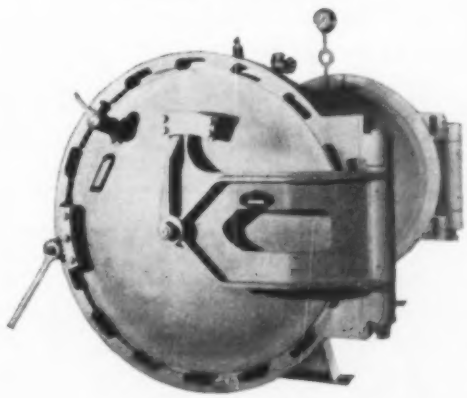

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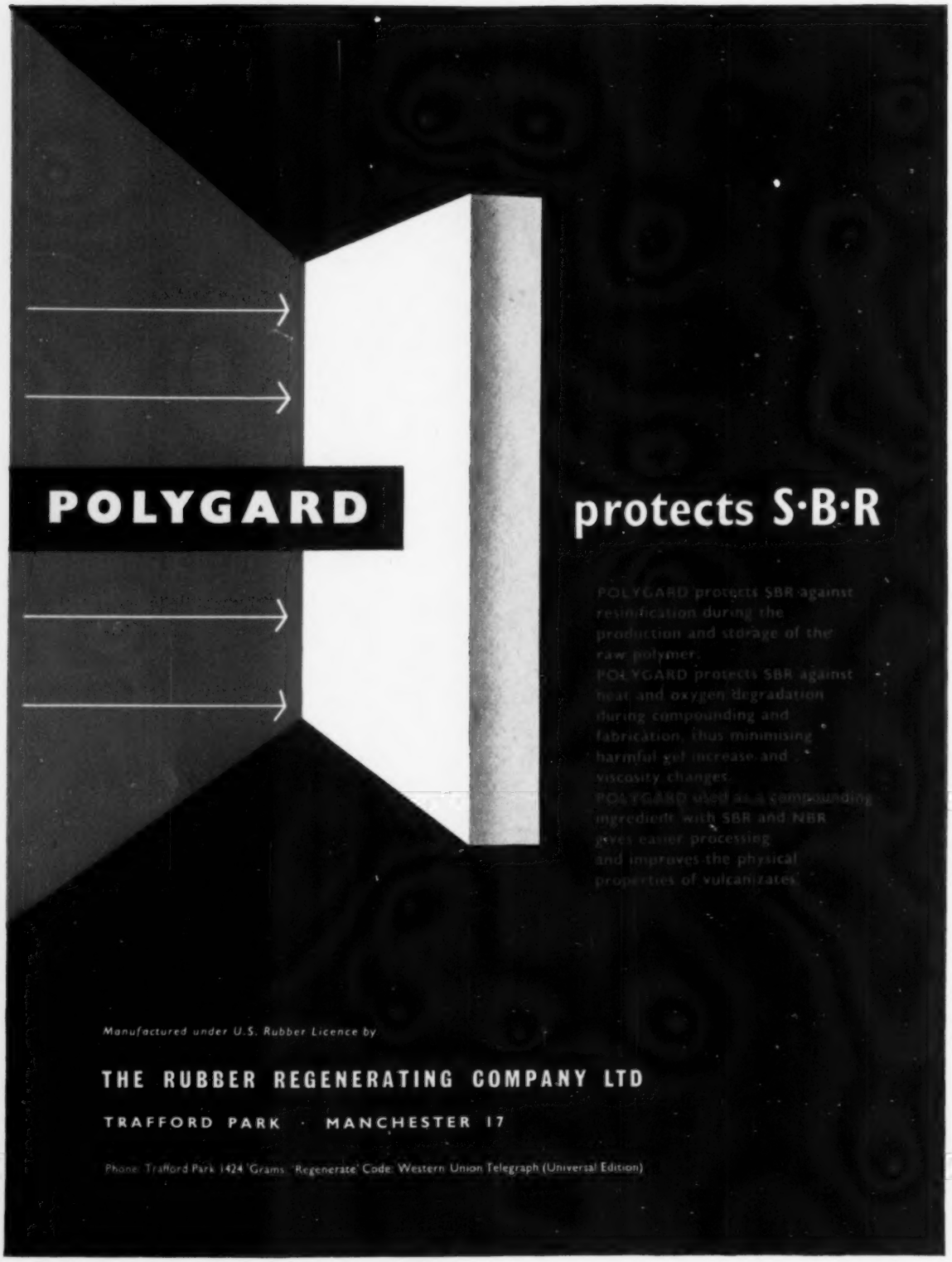
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